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IN THE

Supreme Court of the United States

OCTOBER TERM, 1951.

No. 714

UNION CARBIDE & CARBON CORPORATION,
Petitioner,

vs.

GRAVER TANK & MFG. CO., INC., and
THE LINCOLN ELECTRIC COMPANY,
Respondents.

PETITION FOR WRIT OF CERTIORARI TO THE COURT OF APPEALS FOR THE SEVENTH CIRCUIT,

AND

BRIEF IN SUPPORT.

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April 15, 1952.

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THE LINCOLN ELECTRIC COMPANY,
Respondents.

PETITION FOR WRIT OF CERTIORARI.

To The Honorable The Chief Justice and The Associate Justices of the Supreme Court of the United States:

Petitioner Union Carbide & Carbon Corporation prays that writ of certiorari issue to the United States Court of Appeals for the Seventh Circuit to review the judgment entered by said Court on March 26, 1952, in Case No. 10,532, on the docket of said Court, wherein Petitioner was Plaintiff-Appellee, and Respondents were Defendants-Appellants.

This judgment reversed a judgment of contempt entered by the District Court holding Respondents liable for contumacious violation of an injunction forbidding further infringement of United States Letters Patent No. 2,043,960 issued to Lloyd Theodore Jones *et al.* That injunction was issued pursuant to the mandate of this Court.

The present action is ancillary to an original action for infringement of the Jones, *et al.* patent. The original action was brought by the Linde Air Products Company, and the petitioner Union Carbide and Carbon Corporation, Linde's successor by merger, was substituted as plaintiff. In the original action there was a three weeks' trial in 1947, whereupon:

1. Judge Luther M. Swygert, sitting in the District Court, held composition claims 18, 20, 22, and 23 to be valid and infringed and also held certain process claims and two broad composition claims to be invalid (86 F. Supp. 191; Ct. Dec. 1)*;

2. The Court of Appeals affirmed as to claims 18, 20, 22 and 23, and reversed as to the claims which the District Court had held invalid (167 F. 2d 531, Ct. Dec. 26).

3. This Court, upon grant of Petition for Certiorari, affirmed the judgment holding claims 18, 20, 22 and 23 valid and infringed and restored the decree of the District Court as to the other claims (336 U. S. 271, Ct. Dec. 42).

4. After reargument limited to the issue of infringement of claims 18, 20, 22, and 23, this Court again affirmed (339 U. S. 605, Ct. Dec. 51).

Pursuant to the mandate of this Court, the District Court issued its writ of permanent injunction. The pres-

---

* Abbreviations used in citations:

R. The printed record in the contempt proceeding.

I O. R. First volume of old printed record in the original action.

II O. R. Second volume of old printed record.

Ct. Dec. Printed book of "Court Decisions" submitted herewith for the convenience of the Court in making ready reference to the various opinions in this case and to Judge Swygert's and Judge Dewey's findings of fact.

ent proceeding was brought by motion to punish the respondents for contempt by reason of their continued sale of welding compositions or fluxes which infringed claims 18, 20, 22 and 23. In this contempt proceeding there was a trial lasting more than two weeks, whereupon:

1. Judge Charles A. Dewey, sitting in the District Court, held that the Respondents' newly numbered fluxes, sold after issuance of the injunction, trespassed on claims 18, 20, 22 and 23, and that these fluxes had been copied from the patent itself. It entered a judgment of contempt (R. 1035-40; Ct. Dec. 63, 69).

2. The Court of Appeals, in the face of that long history of adjudication, and in the face of the District Court's findings of fact, reversed (Ct. Dec. 77).

Jurisdiction.

This Court has jurisdiction to review the judgment in question under Section 1254(1) of the Judicial Code, as revised by the Act of June 25, 1948, 28 U. S. C. 1254(1) (1951 Supp., 1946 Ed.).

The judgment below was entered March 26, 1952 (Ct. Dec. 77).

Matter Involved.

The writ of permanent injunction, the violation of which is charged in this proceeding, forbids the Respondents:

". . . from making, using, advertising, or selling Lincolnweld 660 Flux or any other welding composition or flux covered by any of claims 18, 20, 22 and 23 of said patent No. 2,043,960 . . ." (R. 27).

The "660 Flux" is the flux which this Court held to be an infringement in the previous hearings on this case. Since the issuance of the injunction respondent Lincoln has manufactured and sold, in substitution for the "660 flux", a so-called "760 flux" and other variously numbered fluxes, viz., 770, 780 and 840. Respondent Graver is a user of Lincoln 780 flux.

Basically, the controversy is this:

1. After this Court has expressly forbidden Lincoln from marketing the previous 660 flux, can Lincoln with impunity evade the injunction by substituting fluxes which are operationally identical with the 660 flux and are made from the same ingredients in the same proportions, and differ simply in that the ingredients are not heat-treated to quite so high a temperature? The District Court found that respondents' present fluxes amounted to merely a colorable variation of that previously condemned and that their conduct was reckless. The Court of Appeals in reversing held that the claims had been avoided.

2. Is Lincoln to be permitted to copy these present fluxes, as the District Court found it had done, following simply directions taken from the patent—a patent which this Court held valid by unanimous decision—and justify its piracy by the contention that through just slightly undercooking a flux it has produced a different thing?

The Court of Appeals has granted respondent Lincoln the right to appropriate from the face of the patent itself one of the outstanding inventions of our generation—a result this Court so roundly condemned in its earlier decision in this case (339 U. S. 605).

This Contempt Proceeding.

Petitioner filed its motion dated December 1, 1950 and asked the Court to adjudge the respondents in contempt of court for violating the writ of permanent injunction. Because of the congested calendar and subsequent ill health of Judge Swygert, the matter could not be tried until November, 1951, when Judge Charles A. Dewey sat by special assignment.

The trial of the contempt proceeding lasted for more than two weeks. Just as Judge Swygert had done at the trial in 1947, Judge Dewey saw and heard a number of experts and other witnesses on both sides, and also witnessed several demonstrations in welding laboratories in the presence of the experts and the parties and counsel.

The trial of the contempt motion lasted for more than two weeks. After briefs and oral argument, Judge Dewey handed down his memorandum opinion on November 26, 1951, in favor of petitioner and imposed penalties upon respondents for contempt (R. 1035-41; Ct. Dec. 63-70).

On December 10 there was an extended hearing (R. 1042-1112) and Judge Dewey settled and signed findings of fact and conclusions of law (R. 1113-7; Ct. Dec. 71-6) and the order and decree (R. 1118-9).

Operation of the Patented Flux.

The patented flux, which Judge Dewey found the respondents had continued to copy, is used in automatic electric welding. It is a granular material which is heaped up along the seam to be welded and beneath which the welding action takes place.

The "welding composition discovered by the inventors is the heart of the invention" (Judge Swygert, 86 F. Supp. at p. 196, Ct. Dec. 10).

The speeds at which welding can be done with this flux and which it makes possible "dwarf those of any other method" (Judge Swygert, 86 F. Supp. at p. 192, Ct. Dec. 2).

The welds produced by this flux "are of the highest quality" (Judge Swygert, 86 F. Supp. at p. 192, Ct. Dec. 2).

Welding with the patented flux "differs vastly from electric-arc hand welding either of the bare rod or coated rod variety" (Judge Swygert, 86 F. Supp. at p. 192, Ct. Dec. 1).

This invention "was an important improvement in electric welding and an outstanding contribution to, and an important improvement in the art of electric welding" (Judge Dewey, R. 1036; Ct. Dec. 64-5).

Figure 1 shows the prior art—and more specifically hand welding with a coated rod and with its typical dazzling open arc, smoke and splatter (Pltf's Ex. 156, I O. R. 228; see Finding No. 5, R. 20). The usual current used in such welding was 225 amperes (I O. R. 75, 883). It is not possible to deposit a bead more than one-eighth inch thick at a single pass.

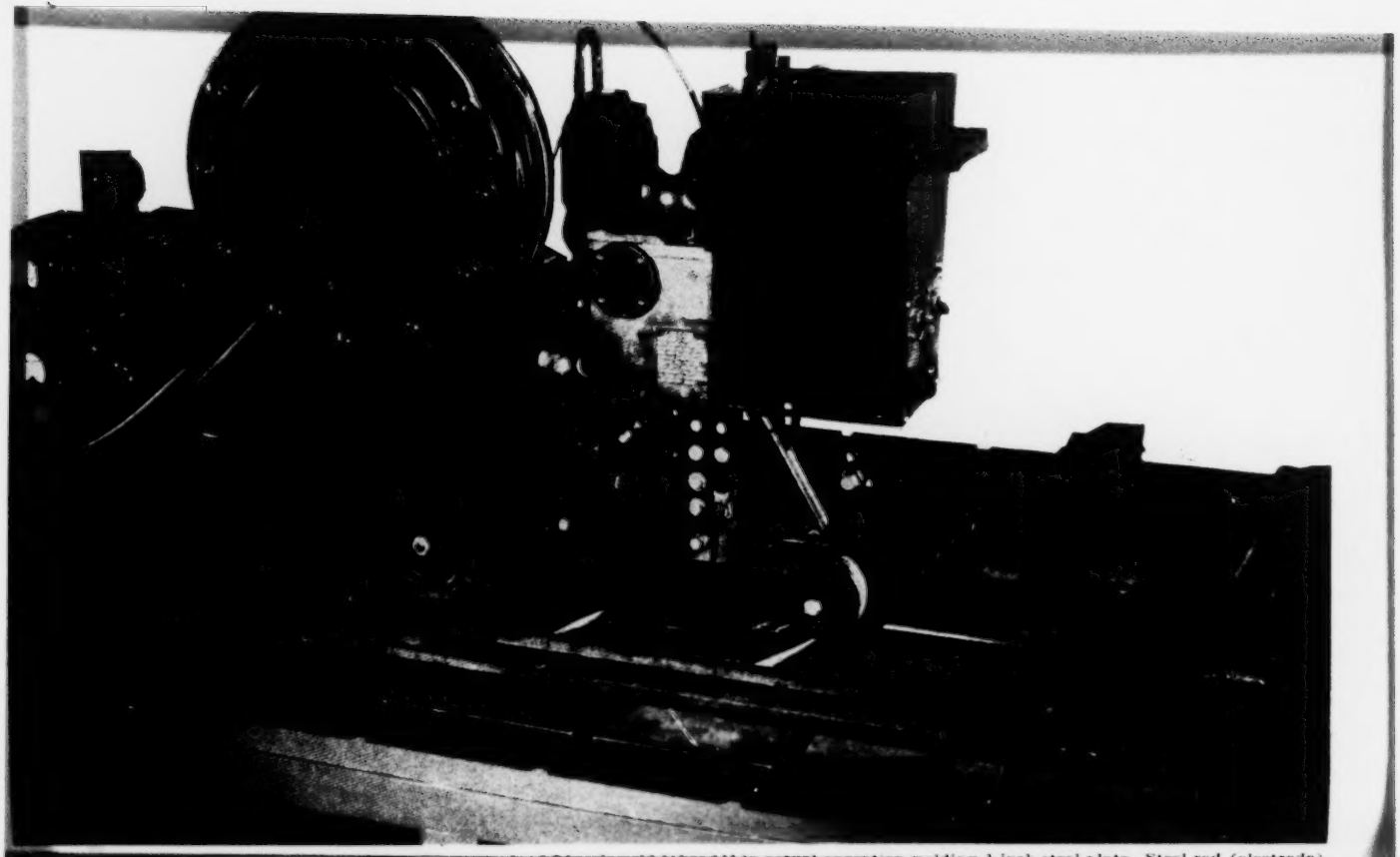
"In . . . coated rod hand welding, the electric arc creates a blinding glare, and there is a great amount of smoke and splatter" (Judge Swygert, 86 F. Supp. at p. 192, Ct. Dec. 1).

As the coated rod melted, the flux coating also melted and generated gas. This gas served to shield the molten metal from the air and resulted in an enormous improvement, as compared to predecessor bare rod welding, in the quality of the weld metal deposited (I O. R. 174).

This coated rod welding yielded the best in quality and performance that the art prior to the invention in suit had been able to achieve (I O. R. 174). The great disadvantage of coated rod welding is that it is slow, laborious and costly. The operator must make several "passes" and lay down

Fig. 1. *Coated Rod Welding*
(Pltf's Ex. 156, I O. R. 228)

Deposits ⅛ inch bead of metal. Employs 225 amperes of current. Shows dazzling open arc.



enough one-eighth inch beads to fill up the "V" made by the beveled edges of the plates (I O. R. 115).

Figure 2 shows the welding made possible by the Jones *et al.* invention (Pltf's Ex. 189, I O. R. 227). Specifically, it is a photograph of an automatic welding head using respondent's flux. This photograph was taken while the welding head was actually in operation welding one-inch steel plate.

In using the patented flux, it is fed from a hopper onto the plate edges which are to be welded together. A welding rod or electrode is fed down through the flux composition, being unwound automatically from a reel. An electric current which produces the heat to weld the plates is conducted from the rod to the base metal. Melting of the tip of the rod and plate edges to form the weld takes place under the blanket of flux.

Earlier attempts had been made to do automatic welding with the Robinoff clay flux method. In it "constant flashings occur, and the arc is always at least partially visible". There was a "great amount of porosity contained in the welds produced by the so-called clay flux process" (Judge Swygert, 86 F. Supp. at p. 192, Ct. Dec. 1, 2).

As Figure 2 shows, in welding with the patented flux, there is no visible manifestation whatsoever of anything taking place beneath the quiet layer of granular flux. The description from the respondent's catalog emphasizes the difference from "conventional open arc welding":

> "Absence of smoke, fumes, radiated heat, spatter and visible arc eliminates the discomforts of conventional open arc welding and results in an increased operating factor for lowered welding costs" (Pltf's Ex. P-1, p. 4).

When using the patented flux there is "no glare, no open arc, no splatter, and very little, if any smoke in the Jones

et al. method" (Judge Swygert, 86 F. Supp. at p. 192, Ct. Dec. 1, 2).

Precisely these same attributes characterize the presently accused Lincoln fluxes, as established by welding demonstrations witnessed by Judge Dewey. For example, in demonstration No. 1 at the trial a single seam was welded using in successive sections petitioner's Unionmelt 20, Lincoln 660, and Lincoln 760 and 770. The weld rod moved along through one flux after another without interruption or change and the welding action and finished welds were identical (R. 92-93).

The Composition of the Patent

The patented welding composition or flux is a free-flowing, granular material. It is especially prepared and has no other known use. A large part of the patent specification is given over to discussion of various phases of its chemical composition, its physical and chemical characteristics and properties and to its mode of preparation (*Jones, et al.*, patent, Ex. P-10, reproduced at I O. R. 955).

As Judge Swygert found, this new composition operates in a manner entirely different from coated rod welding (I O. R. 911; Ct. Dec. 6). It melts—but instead of forming a gas it forms a pool which entirely surrounds and confines the welding action.

This makes it possible to employ much greater amounts of electric power and to weld and deposit metal at rates never before dreamed of.

Of the four claims (18, 20, 22 and 23) here involved, claim 23 may be taken as typical and reads (p. 6, col. 2, ll. 13, *et seq.*, I O. R. 960):

> "23. A finely-divided unbonded fusible composition for use in electric welding employing a bare metal electrode as a source of weld metal, said

composition being substantially free from substances capable of evolving a detrimental quantity of gas under welding conditions and containing calcium fluoride and a major proportion of one or more alkaline earth metal silicates."

The claims are further illuminated by the following from the patent specifications (p. 2, col. 1, ll. 42, *et seq.*, I O. R. 956):

"A large number of experimental welds which we have made support the conclusion that the properties of a successful welding composition for this method of welding are these:

"(1) The chemical reactions between the components of the welding composition must be completed before it is used in welding. Failure in this regard most surely invites porosity.

"(2) It must be capable of controlling the penetration and the width of the weld.

"(3) Its fluidity at welding temperatures must be such that it will not become entrained with the molten metal.

"(4) It must consist of chemicals which are not detrimental to the properties of the steel, and

"(5) It must be readily removable from the finished weld.

"The composition of the welding medium is of the utmost importance. The particular composition that is to be used is determined by the quality and thickness of the metal plates to be welded, by the current and voltage to be used, and by the properties it is desired to impart to the weld metal."

The Accused Compositions.

Respondent Lincoln Electric Company first sold its 660 flux in 1942 (R. 22). That was after petitioner's welding

composition, known as "Unionmelt", had met with wide public acceptance.

The Lincolnweld 660 flux was the infringing composition at the time of the original trial in 1947 (R. 22). It was actually identical with Unionmelt 20 in all respects—except one. The single respect in which these fluxes were not identical, was that the Lincoln Company substituted manganese for a large proportion of the alkaline earth metals as the "basic" constituent of the metallic silicate (R. 16).

All courts held that the Lincoln Electric Company could not escape the holding of infringement by this substitution.

In face of the courts' decisions, the Lincoln Company trebled its production (Pltf's Ex. P-36) and continued to exploit this very flux, the 660 flux, as long as it had the benefit of supersedeas, that is, down to July 10, 1950. The Lincoln Company sold more than 40,000,000 pounds of that particular flux.

The Lincoln Company wanted to continue to reap the benefits of the invention and to keep at least one step ahead of the courts. The Court of Appeals on April 16, 1948 handed down its decision; and respondent Lincoln promptly brought out the first of its newly numbered fluxes, giving it the number 770.

Respondent's purpose was stated in a letter the general sales manager sent out twelve days after the argument in the Court of Appeals in 1948. That was a "confidential" letter to all district managers. It read in part as follows:

> "For your confidential information, we are producing in Cleveland today approximately three times as much 660 Flux as was being sold in August, 1947."

Here it should be noted that August, 1947, was just after Judge Swygert's decision that the 660 flux was pirated from the Jones *et al.* invention—yet in the face of that decision Lincoln trebled its production.

The letter continued:

> "In addition to that, we are developing the new low-cost flux which has been field tested and will be available very soon. We will have capacity for this flux equal to about three times our present 660 production."
>
> • • • • • •
>
> "It is evident to you that we are prepared in this matter, whether we win, lose or draw in our present patent suit" (Pltf's Ex. P-36).*

Again, after the first decision of this Court, respondent Lincoln brought out another variation, called 780, in March, 1949. Still again, after the second decision of this Court, Lincoln brought out still another new number, 760, in June, 1950.

These new numbers (the "700 series" Lincoln fluxes) were compounded from the same ingredients and in the same proportions as the 660 flux (Pltf's Ex. P-85). They differed from the 660, and among themselves, only in the amount of furnacing (cooking) that was given the constituent materials prior to and during the final preparations of the flux.

The 840 Flux.

Petitioner's contempt motion, as filed in December, 1950, originally named the 770, 780 and 760 fluxes.

Respondent Lincoln continued its efforts to keep one step ahead of the courts and brought out still another variation early in 1951, giving it the new number 840. By leave of court, and over respondents' opposition, the motion was amended to include this new number (R. 112).

The composition of 840 differs in two respects from the 770, 780 and 760 fluxes, but neither serves to distinguish 840 from the compositions of the Jones *et al.* patent—indeed, one serves to bring it closer.

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* Emphasis supplied throughout this petition and brief.

The first difference is that, for a substantial part of the manganese in the 700 series fluxes, Lincoln substituted magnesium. Magnesium is one of the alkaline earth metals, and the inventors in the patent actually indicated their preference for magnesium, because magnesium is cheaper than manganese (R. 972). This substitution brings 840 even more clearly within the literal wording of the patent claims than any of its predecessors.

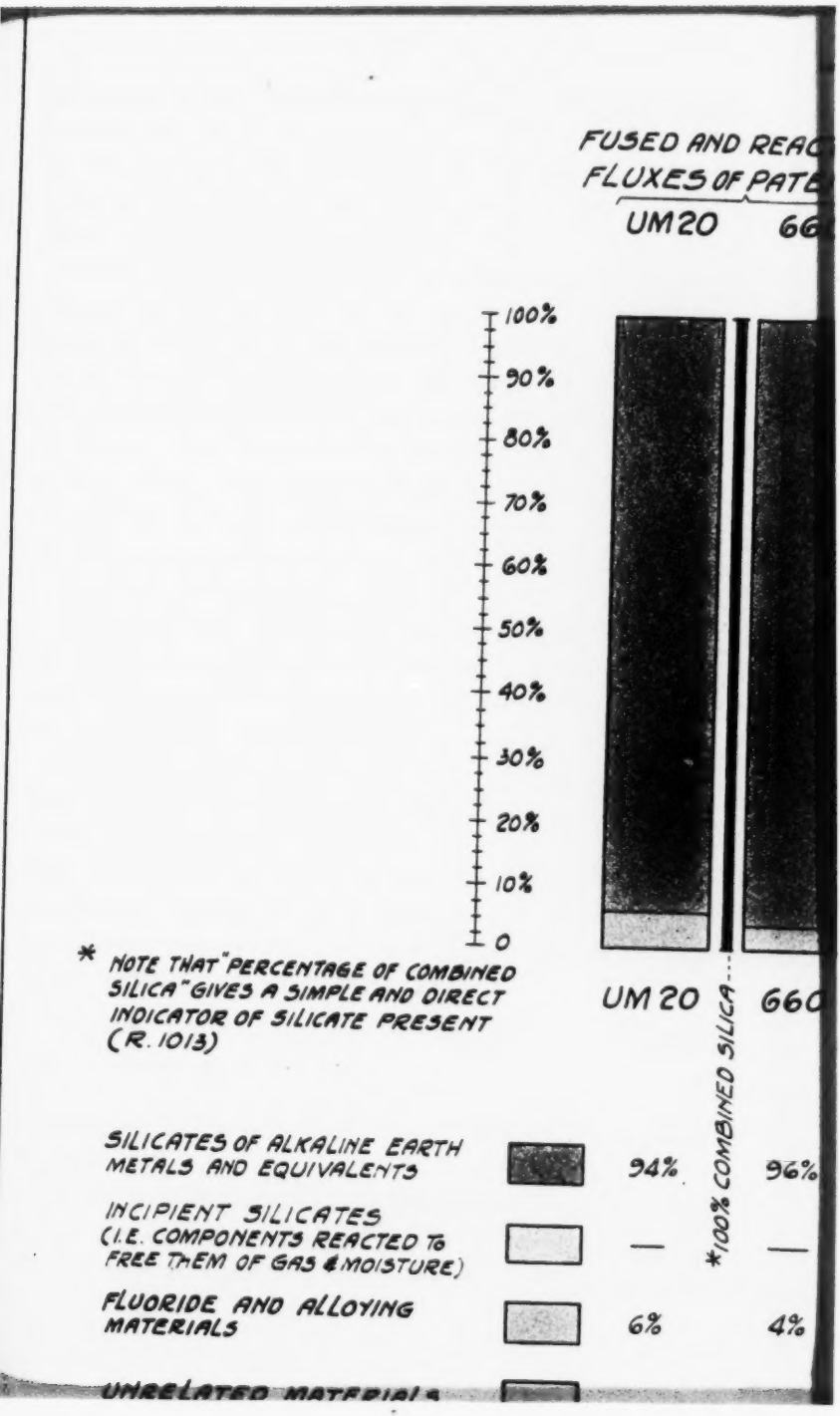
The second difference is that respondents, in the 840 flux, have added many times as much alumina as they had before —so that it constitutes "20% of the 840 flux" (R. 601). The other Lincolnweld fluxes have only about 1% or 2% alumina, conforming to the Jones *et al.* patent, which recommends up to 8% (p. 2, col. 2, ll. 16-18). Our evidence, and it is undisputed here, showed that this great excess of alumina in the 840 flux did not serve any useful purpose but was simply and solely an adulterant, a "stretcher"—it served merely to reduce the ostensible percentage of "silicate" (R. 121, 167, 233, 368).

Respondents deliberately let this point go by default. They never offered a single bit of evidence on it. Nor in briefs or argument in the District Court or in the Court of Appeals, have they attempted to contradict our statement that the excess alumina was put in merely as a "stretcher" so that the accompanying amount of silicate in the flux would look proportionately smaller when listed on a percentage basis.

How nakedly does such conduct reveal respondents' intent? Yet the Court of Appeals lets the matter go without mention.

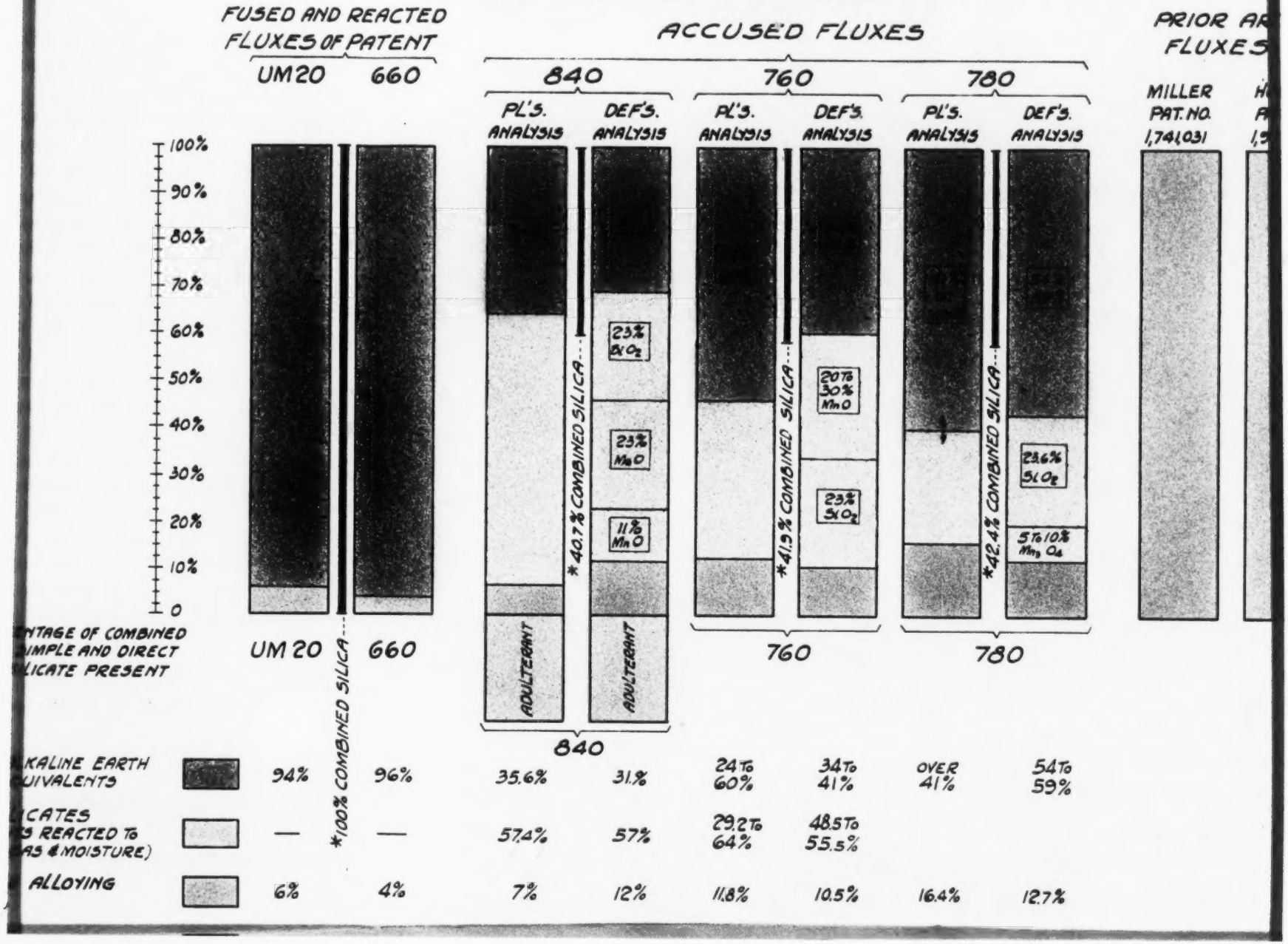
Comparison Chart.

The colored chart reproduced on the facing page is referred to at some length in the opinion of the Court of

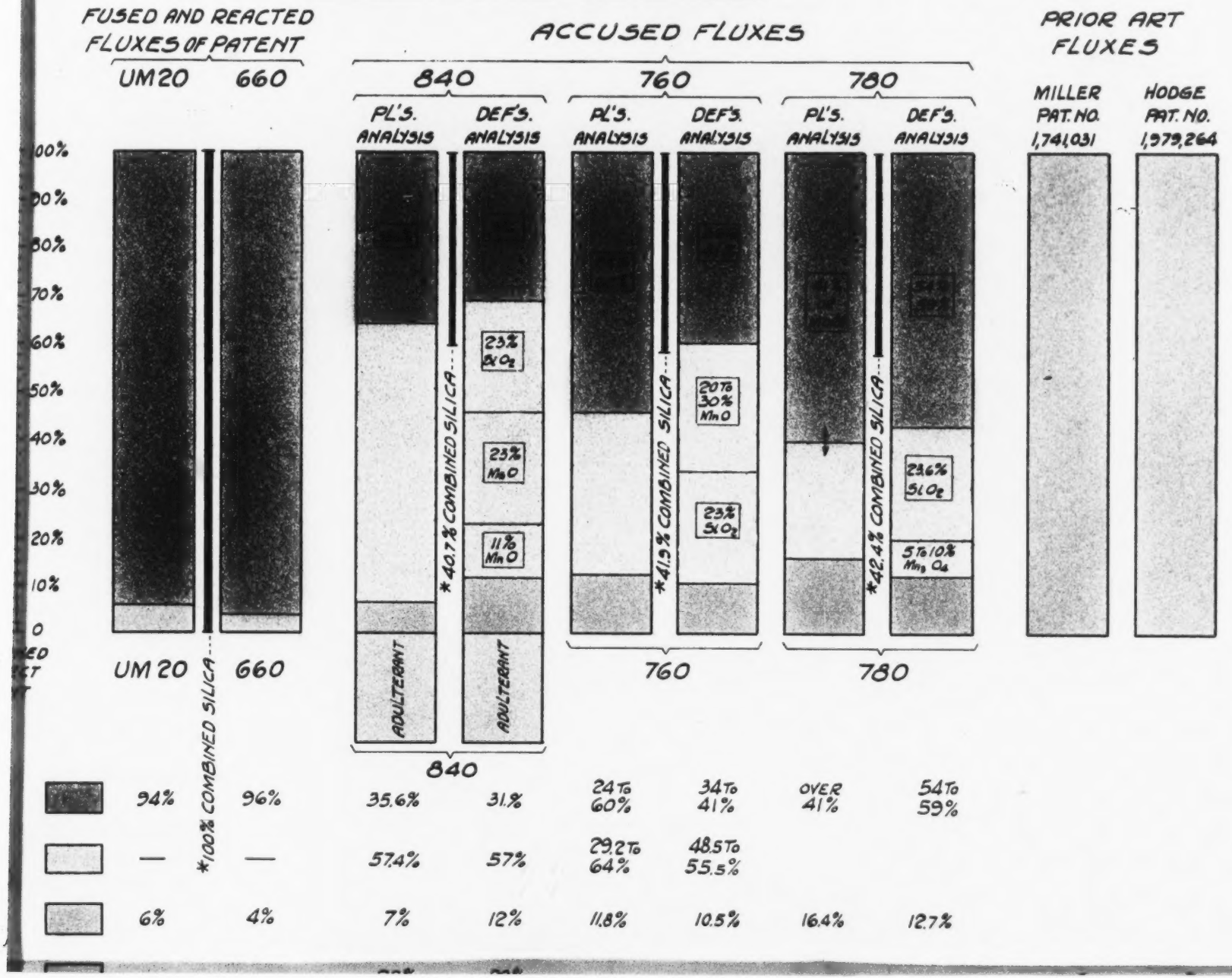


* NOTE THAT "PERCENTAGE OF COMBINED SILICA" GIVES A SIMPLE AND DIRECT INDICATOR OF SILICATE PRESENT (R. 1013)

PLAINTIFF'S CHART SHOWING PROPORTIONS OF FLUXES



PLAINTIFF'S CHART SHOWING PROPORTIONS OF FLUXES



Appeals (Ct. Dec. 89) and is reproduced herein for the convenience of this Court.

This chart shows the effect of the undercooking to which the presently accused Lincoln fluxes have been subjected.

Substantially identical raw materials, and in the same proportions, are mixed together in making the 700 series fluxes as were used for the previously adjudicated 660 flux (R. 208). In both instances the materials are heated sufficiently to react chemically each of the constituent materials. The "chemical condition", which the patent advises is important, and in which the materials are freed of moisture and any other substances capable of evolving deleterious amounts of gas, is thus brought about (Ex. P-10, p. 3, col. 1, ll. 4-20).

Indeed, it was shown by actual demonstration before the trial court that it was impossible to make a weld using simply a mixture of the raw materials, and that such chemical reaction of them was imperative (R. 105).

In the case of the earlier and previously adjudicated 660 flux, the ingredients had been chemically reacted by heating to reduce the carbonates, higher oxides, etc. so that they were free of moisture and sources of gas, all as directed by the patent. And the heating had been carried on to a high enough temperature so that those reacted ingredients also reacted with each other on the pattern:

silica + metallic oxides → silicate
(acid constituent) (plus) (basic constituent) (yields)

to a degree that substantially the whole thing is converted to "silicate".

In the case of the later Lincoln fluxes, those same ingredients are again chemically reacted by heating to reduce the carbonates, higher oxides, and other ingredients, free-

ing them of moisture and gas-forming materials. But the heating is only carried far enough that a portion (about half) of those individually reacted ingredients are combined with each other as silicates.

No change in welding properties occurs, however, in the remaining or incompleted increment of reaction with each other. All chemical conversion essential to use has been accomplished (Cf. Findings 5 and 6, R. 1114; Ct. Dec. 72).

The Trial Court found that the heating in the Lincoln furnace was carried on to a point only a little short of that required for complete fusion, that is to say, complete conversion to silicate (Finding 7, R. 1114; Ct. Dec. 72-3). Moreover, the Trial Court stated in his Finding No. 8:

> "The materials when put in the Lincoln kilns are ground to an extremely fine particle size, and mixed with water to get a uniform dispersion, and sodium silicate or sodium carbonate added which acts as a so-called mineralizer to promote the reaction."

And in the final sentence of Finding No. 8, Judge Dewey stated, with respect to these costly steps in the preparation of the ingredients, that Lincoln's purpose was to afford "a maximum of silicate-forming reaction at temperatures short of complete fusion" (Finding 8, R. 1114; Ct. Dec. 73).

The Trial Court found that this mixture of silicate with individually reacted oxides (i. e., "incipient" silicates) which constitute the accused fluxes was an "equivalent" (Finding 10, R. 1114-15; Ct. Dec. 73). The Court of Appeals, despite that finding, reversed.

Findings as to Identity.

After lengthy trial the Trial Court made most explicit findings as to the accused fluxes.

He found that they were "copied" from the Jones *et al.* patent (Finding 1, R. 1113; Ct. Dec. 71).

On the question whether or not these fluxes are the same thing as described in the claims, the Trial Court made the general finding that:

> "* * * each of them [is] substantially the same thing as the compositions defined in each of Jones, *et al.*, claims 18, 20, 22 and 23" (Finding 14, R. 1115; Ct. Dec. 74).

and also made findings specifically as to physical structure:

> "The 'physical condition' for the flux, described in the patent specification, has also been satisfied in the defendants' fluxes. Each of their fluxes is a finely-divided, free-flowing granular material" (Finding 12, R. 1115; Ct. Dec. 74).
>
> "The Lincolnweld 760, 770, 780 and 840 fluxes are all granular, free-flowing, finely divided materials. They can all be fed from a hopper into a seam to be welded in the same manner as other compositions made up from the Jones, *et al.* Patent No. 2,043,960. They all have practically the same particle size, same feel to the touch, and similarity of color as other compositions made up from the patent" (Finding 2, R. 1113; Ct. Dec. 72).
>
> "The Lincolnweld 760, 770, 780 and 840 fluxes are all 'unbonded' compositions within the meaning of that term as used in claims 22 and 23 of the Jones *et al.* patent" (Finding 3, R. 1113; Ct. Dec. 72).

and specifically as to chemical content:

> "The materials have been completely reacted by the kiln treatment. The basic constituents are completely reacted by the time they leave the kiln. So, too, is the acidic constituent. Such reactions render the flux substantially anhydrous and free of gas-forming materials that would yield deleterious amounts of gas during welding (page 3, col. 1, lines 4-11). Moreover, such reacted acidic and basic mate-

rials are reacted with each other by the time they come out of the Lincoln kilns to an extent that the resulting flux contains a substantial amount of silicate" (Finding 9, R. 1114; Ct. Dec. 73).

"There is sufficient silicate in the defendants' fluxes to accomplish the desired results, and they are substantially the same with respect to silicates as required by claims Nos. 18, 20, 22 and 23 of the Jones *et al.* patent. Such of the silicate-forming materials present in the finished fluxes as are not completely combined with each other to form silicates are, however, reacted to the extent required by the patent to eliminate gas-forming reactions and are, therefore, the equivalent of silicate for the purposes of Claims 18, 20, 22 and 23" (Finding 10, R. 1114-15; Ct. Dec. 73).

"The particular silicates in the Lincoln 760, 770, 780 and 840 fluxes include manganese silicate and complex manganese, sodium, iron, calcium silicates. The 840 flux contains, in addition, silicates of magnesium and zirconium" (Finding 11, R. 1115; Ct. Dec. 73).

The Trial Court found as to identity of operation:

"They operate in substantially the same way as such compositions, * * *" (Finding 14, R. 1115; Ct. Dec. 74).

and more specifically that:

"The same physical set-up of equipment is used in welding with the Lincolnweld 760, 770, 780 and 840 fluxes as is described in the patent. The same procedures are employed. The operating conditions are practically the same. For example, in welding a plate of selected thickness, the same values of voltage, current and travel speed are employed" (Finding 4, R. 1113; Ct. Dec. 72).

"The same welding action occurs when using the Lincolnweld 760, 770, 780 and 840 fluxes as is

described in the patent and in the opinion of this Court dated June 6, 1947. The same melting of the plate and rod under a quiescent layer of granular flux occurs, with freedom from open-arc glare, fumes, smoke and splatter" (Finding 5, R. 1114; Ct. Dec. 72).

The Trial Court found, on the subject of identity of results, generally that:

> "* * * they produce the same result" (Finding 14, R. 1115; Ct. Dec. 74).

and more specifically that:

> "The finished welds made with the Lincolnweld 760, 770, 780 and 840 fluxes are the same as those produced with what the patent describes as the preferred composition. The finished welds are of the same size, shape, appearance and structure. If there is any additional tensile strength of welds made with defendants' fluxes, or ability of those fluxes to tolerate mill scale or oil, it is due to the addition to such fluxes of additional elements. Such additives do not change the essential character of the composition defined in the claims" (Finding 6, R. 1114; Ct. Dec. 72).

Questions Presented.

The questions presented are:

1. Whether respondents have violated the injunction previously issued in this case by making, using and selling their 760, 770, 780 and 840 fluxes in substitution for their previously adjudicated 660 flux.

2. Whether the Trial Court's unreversed findings of fact have been improperly displaced by contrary findings of the Court of Appeals.

3. Whether the Trial Court's unreversed findings of fact have been improperly displaced by erroneous conclusions of law.

4. Whether the accused fluxes are, as the Trial Court found, the equivalent of the validly claimed compositions set out in claims 18, 20, 22 and 23 of the Jones *et al.* patent.

5. Whether any circumstances are reflected in the record here which as a matter of law should estop the petitioner from showing the true fact to be, as determined in the unreversed findings of the trier of facts, that the accused fluxes are the equivalent of the composition defined in claims 18, 20, 22 and 23 of the Jones *et al.* patent.

Reasons Relied on for Allowance of Writ.

The reasons relied on for issuance of the writ prayed are:

1. The importance of the patent questions here involved and the widespread public interest in them call for a review of the decision below. This petition brings to the Court what is, in effect, not a new case but an item of unfinished business. The two decisions which this Court has already rendered in this case are landmarks in the patent law. The effect of the Court of Appeals' decision is to repudiate those decisions. Leaving in doubt as it does important questions of law, such considerations alone call for a further review by this Court.

2. The Court of Appeals disregarded findings of fact made by the Trial Court and made contrary findings of its own, and thus the decision is in conflict with the decisions of this Court in this very case. To reach its judgment of reversal the Court of Appeals had to, and did, disregard the explicit findings of fact of the Trial Court. Yet it did so without any determination that such findings were clearly

erroneous or unsupported by credible evidence. Instead of taking the findings of the trier of facts as its point of departure and applying the law to the facts so found, the Court of Appeals made an independent survey of the record and stated its own conception of the facts as premise for its decision. In so doing it adopted a course in diametric opposition to this Court's decision in this very case as to the application of Rule 52(a) of the Federal Rules of Civil Procedure. Unless corrected upon review by this Court, the decision of the Court of Appeals will vitiate the salutary effect which this Court's earlier decision has had in simplifying and compressing patent litigation into proportions reasonably calculated for proper handling in a reviewing court.

3. The Court of Appeals has applied the law in a manner contrary to the decisions of this Court, and indeed, contrary to its decision in this very case on the subject of the doctrine of equivalents. Despite this Court's admonition in this case that the determination of an "equivalent" is an issue of fact, to be determined by the trier of facts, the Court of Appeals has ignored the explicit findings of the Trial Court on the point and, moreover, has insisted upon simply a literal reading and application of the claims. In so doing it has proceeded in direct opposition to the second decision handed down by the majority of this Court upon the reargument of this case.

4. The Court of Appeals erred in basing its decision upon a false and non-existent issue of estoppel. The Court of Appeals reasoned that the doctrine of equivalents is "met head-on with the estoppel principle", and further asserts that the question is one of first impression, finding "no case where this question has been discussed" (Ct. Dec. 84). That, if it were sound, would in itself be a cogent

reason for review here since it would present an important, novel question for decision. But, in fact, the collision does not exist when the law is applied as directed by this Court in its previous decisions in this case.

5. The Court of Appeals disregarded the principle announced by this Court that "infringement is not merely a matter of words but is one of substance." In so doing the Court of Appeals has permitted an adjudged copyist and unscrupulous infringer to appropriate, with the most transparent of evasions, the substance of a great invention. It has permitted the respondents' contempt for patents to be translated into contempt for the judicial process.

Conclusion.

Under the judgment in review the substance of a great invention is handed over to an adjudged copyist. Before any such conveyance is sealed this Court should examine the justice of the grant.

The writ should issue.

Dated, April 15, 1952.

Respectfully submitted,

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Attorneys for Petitioner.

IN THE

Supreme Court of the United States

OCTOBER TERM, 1951.

No. .....

UNION CARBIDE & CARBON CORPORATION,
Petitioner,

vs.

GRAVER TANK & MFG. CO., INC., and
THE LINCOLN ELECTRIC COMPANY,
Respondents.

BRIEF IN SUPPORT OF PETITION FOR WRIT OF CERTIORARI.

The writ of permanent injunction was issued pursuant to this Court's mandate.

This Court should now issue its writ to restore the judgment of contempt entered against these respondents for their contumacious disregard of the injunction. This Court should say whether, under the patent law:

> 1. After this Court has expressly forbidden Lincoln from marketing the previous 660 flux, Lincoln can with impunity evade the injunction by substituting fluxes which are operationally identical with the 660 flux and are made from the same ingredients in the same proportions, and differ simply in that the ingredients are not heat-treated to quite so high a temperature.

2. Lincoln should be permitted to copy these present fluxes, as the District Court found it had done, following simply directions taken from the patent—a patent which this Court held valid by unanimous decision—and justify its piracy by the contention that through just slightly undercooking a flux it has produced a different thing.

Opinions Below.

The opinion of the District Court is as yet unreported. It is reproduced at R. 1113 and also at page 71 of the printed book of "Court Decisions". This book is submitted herewith for the convenience of the Court and contains all of the decisions in this case and also the findings of fact made by Judge Swygert, as well as those made by Judge Dewey.

Judge Swygert's findings appear in the record at R. 19 and Ct. Dec. 19. Judge Dewey's findings appear in the record at R. 1113 and Ct. Dec. 71.

The opinion of the Court of Appeals for the Seventh Circuit is also unreported, but is reproduced in "Court Decisions" at page 77.

Jurisdiction.

As noted in the petition, jurisdiction is invoked under §1254(1) of the Judicial Code, as revised by the Act of June 25, 1948, 28 U. S. C. 1254(1) (1951 Supp., 1946 Ed.).

Statement of Facts.

The facts are set forth in the foregoing petition.

Specification of Errors to be Urged.

The Circuit Court of Appeals erred:

1. In holding the respondents not to have violated the injunction previously issued in this case by making, using and selling their 760, 770, 780 and 840 fluxes in substitution for their previously adjudicated 660 flux.

2. In improperly displacing the Trial Court's unreversed findings of fact with its own contrary findings.

3. In improperly displacing the Trial Court's unreversed findings of fact by erroneous conclusions of law.

4. In holding that, contrary to the findings of the Trial Court, the accused fluxes are not the equivalent of the validly claimed compositions set out in Claims 18, 20, 22 and 23 of the Jones, *et al.* patent.

5. In concluding as a matter of law that circumstances reflected in the record here estop the petitioner from showing the true facts to be, as determined in the unreversed findings of the trier of facts, that the accused fluxes are the equivalent of the composition defined in Claims 18, 20, 22 and 23 of the Jones, *et al.* patent.

ARGUMENT.

POINT I.

The importance of the patent questions here involved and the widespread public interest in them call for a review of the decision below.

This patent suit, begun seven years ago, already ranks as a leading case in patent law. This Court has rendered two decisions in this case which are landmarks in the patent law.

This petition brings to the Court, not a new matter, but an item of unfinished business. It would be most unfortunate if the case were left in its present posture. The legal and public importance of this matter is such as to call for a further review by the highest Court.

The decisions of this Court made it clear that the infringement of a patent is a matter of substance and not just a matter of words.

The Court of Appeals has failed to follow that principle.

The widespread public interest in this case is understandable. Success or failure in the enforcement of the Jones, *et. al.* patent against fraudulent variations will have a direct effect upon the attitude of the legal and business community toward our patent system. This is reflected in the attention and discussion this case has already received in legal journals.*

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* Chasan, *Graver* v. *Linde—A Valid Patent*
32 J. Pt. Off. Soc'y 285 (1950);
5 Intra. L. Rev. (N. Y. U.) 70 (1950).

Swanson, *A Discussion of the Application of the Doctrine of Equivalents in the Graver* v. *Linde Case*
33 J. Pat. Off. Soc'y 285 (1950).

Notes:
49 Col. L. Rev. 685 (1949);

(Footnote continued on next page)

The first decision of this Court held that the Jones, *et al.* invention "dwarfs" all that went before. Mr. Justices Black and Douglas stated that it met the highest possible test, the "flash of creative genius" test enunciated in *Cuno Engineering Corp.* v. *Automatic Devices Corp.*, 314 U. S. 84 (1941). As an indication of the importance of this invention, the unanimous decision of this Court sustaining claims 18, 20, 22 and 23 of the Jones, *et al.* patent was the first in many years to uphold any patent. None has since been sustained.

But this patent was subjected to a further severe test as to its scope. This Court granted a petition for rehearing on the question of the application of the doctrine of equivalents. The second decision of this Court decisively reaffirmed the century-old doctrine of equivalents and applied it to sustain the charge of infringement made against the Lincolnweld 660 flux. It held that material to be a fraudulent variation of the welding compositions covered by the valid claims of the Jones, *et al.* patent.

In its second decision, this Court reaffirmed the principle that the area of equivalence may vary and is dependent on the importance of the invention. This principle was stated by this Court in *Eibel Process Co.* v. *Minnesota & Ontario Paper Co.*, 261 U. S. 45, 63 (1923):

> "In administering the patent law the court first looks into the art to find what the real merit of the alleged discovery or invention is and whether it has advanced the art substantially. If it has done so,

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44 Ill. L. Rev. 730 (1949);
30 B. U. L. Rev. 569 (1950);
19 G. Wash. L. Rev. 491 (1951).

Recent Cases:
99 U. of Pa. L. Rev. 428 (1950);
5 Rutgers L. Rev. 431 (1951);
39 Calif. L. Rev. 302 (1951).

> then the court is liberal in its construction of the patent to secure to the inventor the reward he deserves. If what he has done works only a slight step forward and that which he says is a discovery is on the border line between mere mechanical change and real invention, then his patent, if sustained, will be given a narrow scope and infringement will be found only in approximate copies of the new device. It is this differing attitude of the courts toward genuine discoveries and slight improvements that reconciles the sometimes apparently conflicting instances of construing specifications and the finding of equivalents in alleged infringements."

Yet, in the present case, the Court of Appeals expressly refused to take into consideration the importance of the invention, and in fact criticized us for devoting "more energy than necessary" to that point (Ct. Dec. 81).

The Court of Appeals treated the question of patent infringement just as a matter of words, making it "the prisoner of a formula"—and thus would give a claim in a patent for a slight improvement exactly the same scope as a claim in a patent for a genuine discovery.

The Court of Appeals said generally with reference to this Court's decision:

> "• • • there is little, if anything, in the opinion which affords an answer to our instant problem" (Ct. Dec. 82).

The question presented on this petition is whether this Court will allow the decision of the Court of Appeals to stand without review, and thus will allow the respondents to make and sell Lincolnweld fluxes which, the Trial Court held, are just minor variations of the 660 flux this Court condemned.

As to those fluxes, the Trial Court made the following findings, among others:

> "1. The defendant Lincoln Electric Company, in making its Lincolnweld 760, 770, 780 and 840 fluxes, in general copied the teachings of the Jones, *et al.* Patent No. 2,043,960" (R. 1113; Ct. Dec. 71).
>
> "14. The Lincolnweld 760, 770, 780 and 840 fluxes are each of them substantially the same thing as the compositions defined in each of Jones, *et al.*, claims 18, 20, 22 and 23. They operate in substantially the same way as such compositions, and they produce the same result" (R. 1115; Ct. Dec. 74).

The findings of fact were made by the Trial Court after a trial lasting more than two weeks, in the course of which Judge Dewey had full opportunity to observe the experts and other witnesses and to judge their credibility and the weight to be given their testimony.

Judge Dewey was in exactly the same position as Judge Swygert was after the earlier trial in 1947.

Judge Dewey concluded that this case called for the application of the principles announced in the earlier decision of this Court, and he summarized them in his conclusions of law as follows:

> I.
>
> "Infringement is not merely a matter of words but is one of substance. In order for a welding composition or flux to infringe claims 18, 20, 22 and 23 of the Jones, *et al.* patent, it must be substantially the same thing, operate in substantially the same way, and produce the same result as the composition described in the claims.
>
> II.
>
> "The claims of the Jones, *et al.* patent are to be read and interpreted in the light of the entire dis-

closure of the patent, not literally *in vacuo*, and the verbiage of the patent should be considered in ascertaining the scope and purview of the claim.

III.

"An 'equivalent' of a composition claimed is an infringement of the claim. The essence of the doctrine of equivalents is that one may not practice a fraud on the patent. If two composition do the same work in substantially the same way, and accomplish substantially the same result, they are the same, they are equivalents, even though they differ in name, form or shape." (R. 1116; Ct. Dec. 75-6)

Thus the Trial Court did find much in the opinion of this Court to apply to the present issue.

The Court of Appeals, on the other hand, failed to find anything in the opinion of this Court which afforded any help in deciding this matter; and the Court of Appeals thereupon reversed.

It is respectfully submitted that the case should not be left in this posture, and that it requires a further review by this Court.

POINT II.

The Court of Appeals disregarded findings of fact made by the Trial Court and made contrary findings of its own, and thus the decision is in conflict with the decisions of this Court in this very case.

The application of Rule 52(a) of the Federal Rules of Civil Procedure in a patent case is a matter of importance. It is not just a matter of form or procedure—it goes to the question of the power of an appellate court to displace findings made by a trial court.

The decision of the Court of Appeals is directly in conflict with the decisions of this Court on this point.

This Court in its first decision in this case had this to say:

> "Rule 52(a) of the Federal Rules of Civil Procedure provides in part: 'Findings of fact shall not be set aside unless clearly erroneous, and due regard shall be given to the opportunity of the trial court to judge of the credibility of the witnesses.' To no type of case is this last clause more appropriately applicable than to the one before us, where the evidence is largely the testimony of experts as to which a trial court may be enlightened by scientific demonstrations" (336 U. S. 274; Ct. Dec. 44).

Again in its second decision, this Court repeated this statement, and also said:

> "It is not for this Court to even essay an independent evaluation of this evidence. This is the function of the trial court" (339 U. S. 611; Ct. Dec. 55).

The Court of Appeals gave lip service to Rule 52(a). It acknowledged in its opinion that

> "Plaintiff, naturally and rightly relies heavily upon the two decisions of the Supreme Court, the first of which (336 U. S. 271) held that Rule 52(a) of the Federal Rules of Civil Procedure is controlling and that reversal is permissible only where the findings of the trial court are 'clearly erroneous' . . ." (Ct. Dec. 82)

The Court of Appeals adverted to what it characterized (Ct. Dec. 82) as a possible modification or retraction by this Court in *Great Atlantic & Pacific Tea Co.* v. *Supermarket Equipment Corp.*, 340 U. S. 147. This Court's decision in reference to the applicability of Rule 52(a) to

patent cases has received widespread attention and has had a most important bearing on the course of patent litigation.*

Having done lip service to Rule 52(a), the Court of Appeals disregarded the findings of the Trial Court and proceeded to adopt its own version of the facts. Specifically, the Court of Appeals ignored the most important statement of fact Judge Dewey made in his opinion:

> "* * * I am abidingly satisfied that the fluxes of the defendants, to-wit: Lincolnweld 770, 780, 760 and 840 are substantially the same with respect to silicates as required by the patent" (R. 1040, Ct. Dec. 68).

The Court of Appeals likewise disregarded other findings of fact bearing on the central issue. Furthermore, the Court of Appeals saw fit to criticize Judge Dewey for rejecting a finding as to the exact percentages of various constituents of the compositions, when the Court of Appeals itself recognized that a finding as to exact percentages was not possible.

Judge Dewey made his findings after a trial which extended over a period of more than two weeks and which was in most respects similar to the trial in 1947 before Judge Swygert. There were 2,430 pages of typewritten

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*_Charles Peckat Mfg. Co._ v. _Jacobs_, 178 F. 2d 794 (7th Cir. 1949);
Barie v. _Superior Tanning Co._, 182 F. 2d 724, 727 (7th Cir. 1950);
Hazeltine Research v. _Admiral Corp._, 183 F. 2d 953, 955 (7th Cir. 1950);
National Rejectors v. _A. B. T. Mfg. Corporation_, 184 F. 2d 612, 615 (7th Cir. 1950);
Imperial Assur. Co. v. _Joseph Supornick & Son_, 184 F. 2d 930, 933 (8th Cir. 1950);
Orison v. _C. Hoffberger Co._, 190 F. 2d 787, 790 (4th Cir. 1951);
Great A & P Tea Co. v. _Supermarket Corp._, 340 U. S. 147, 153 (1950);
Union Carbide & Carbon Corp. v. _Stuart Laboratories, Inc. et al._, 92 U. S. P. Q. 262 (3d Cir. 1952).

transcript—daily copy to both sides. 138 exhibits were introduced by the petitioner and 72 exhibits by the respondents. The oral testimony covered every factual element, and where it was conflicting the Trial Court had the opportunity to appraise the witnesses and judge of their credibility and competence.

Judge Dewey, like Judge Swygert, made trips to plants and laboratories, both petitioner's and respondents', where he observed actual welding demonstrations. The Trial Court also viewed motion pictures of various welding operations.

The Court of Appeals had opportunity to hear only the arguments of counsel—and the main argument for respondents was presented by counsel who came into the case after the trial before Judge Dewey.

Here we are not dealing with a question of validity or patentability or any other mixed question of law and fact. We have here a determination of fact, whether the 700 series fluxes are substantially the same thing as the patented compositions. Most of the testimony, demonstrations and other evidence at the trial was directed to that point.

Respondents, in their brief and argument in the Court of Appeals, hardly mentioned the findings of fact. The Court of Appeals nowhere suggested that any finding made by Judge Dewey was "clearly erroneous", or even that any finding lacked support in the evidence.

The correct attitude an appellate court should take is shown by the first decision of this Court. There this Court reversed the Court of Appeals as to the validity of the process claims and restored the Trial Court's decision on that point, saying,

> "the record * * * while not establishing to a certainty that the findings are right, fall far short of convincing us that they are clearly erroneous" (Ct. Dec. 49).

In reversing Judge Dewey, and in disregarding his findings of fact, the Court of Appeals has proceeded in clear conflict with the statement quoted above from the first decision of this Court which was again emphasized in the second decision.

The Court of Appeals attempted to justify its action by the assertion that

> ". . . we are not so much concerned with the findings made by Judge Dewey as we are with those which he failed to make and on one important issue (subsequently discussed) which he refused to make." (Ct. Dec. 82)

Of the latter the Court of Appeals say at a later point:

> "Judge Dewey did not determine, in fact refused to make a finding, as to the proportion of silicate contained in the accused fluxes." (Ct. Dec. 88-9)

To show such asserted refusal the Court quotes from Judge Dewey's opinion his statement that

> "It would be a little difficult from the testimony of the experts to come to a positive decision. . . ."

But the Court fails to quote the very next sentence, viz.:

> "There is sufficient silicate in the defendants' fluxes to accomplish the desired results, and I am abidingly satisfied that the fluxes of the defendants, to-wit: Lincolnweld 770, 780, 760 and 840 are substantially the same with respect to silicates as required by the patent; that such fluxes infringe because the elements in the composition are first, substantially the same thing as required by the Jones *et al.* patent; and second, operate substantially the same way; and third, they substantially accomplish the same results."

That was not only stated by Judge Dewey in his opinion but it was expressly made a part of his findings of fact (R. 1039-40, Ct. Dec. 68).

Judge Dewey's "refusal to make a finding" in this area was just a refusal to accept the respondents' proposed findings as to specific percentages of materials not in accordance with the evidence (R. 1090-1091). If his findings were inadequate because they failed to include a tabulation of percentages and for that reason "begs the issue" as the Court of Appeals puts it (Ct. Dec. 89), then the proper order was a remand for more specific findings; and the Court of Appeals erred in attempting to make its own findings in this complex chemical field.

The Court of Appeals, in saying Judge Dewey's statement "begs the issue," asked the rhetorical question:

> "How can a composition claim which requires 'a major proportion' be infringed by a composition which contains the critical element only in an 'appreciable degree'?" (Ct. Dec. 89)

This implies that the finding was, only in an appreciable degree. That simply ignores the findings already quoted and specifically the statement that the trier of facts was "abidingly satisfied" that the accused fluxes contained silicates "as required by the patent."

Because the experts did differ as to specific percentages it would have been difficult, as the trial judge said, to come to a decision as to specific percentages on their testimony. But with the other evidence in the case on operation and results to aid in resolving the issue, Judge Dewey not only could but did come to a positive decision, indeed, expressed himself as being "abidingly satisfied".

It is such a finding, so arrived at after exhaustive hearing in a field of complicated technology, that the Court of Appeals has disregarded.

No more apt occasion could, we believe, be afforded this Court for making clear the application of Rule 52(a) in patent litigation. That is a field, moreover, in which application of the rule can be of maximum utility in aiding the effective functioning of the federal courts as a whole.

POINT III.

The Court of Appeals has applied the law in a manner contrary to the decisions of this Court, and indeed, contrary to its decision in this very case on the subject of the doctrine of equivalents.

In its second decision in this case, this Court made forceful restatement of the doctrine of equivalents. It pointed out that

> "The essence of the doctrine is that one may not practice a fraud on a patent". (339 U. S. 608; Ct. Dec. 52)

And as to these very respondents, on these same patent claims, it was pointed out that their then accused flux contained changes which were "colorable only" and served merely to "avoid literal infringement".

That established the law of the case—and the Trial Court, following it, punished the respondents for indulging in precisely the same tactics with its presently accused fluxes.

The Court of Appeals has reversed. In so doing the Court of Appeals has attempted to decide the issue as one of law despite this Court's decision, in this case, that:

> "A finding of equivalence is a determination of fact." (339 U. S. 609; Ct. Dec. 54.)

It is important that the sphere of application of the doctrine of equivalents be made clear, and that its erroneous circumscription by the Court of Appeals here be corrected.

The record affords opportunity to this Court for dealing directly with the point. In this instance the Trial Judge found, generally, that:

> "17. The Lincolnweld 760, 770, 780 and 840 fluxes satisfy the requirements of an 'equivalent' as set forth in Conclusion of Law No. III herewith" (Finding 17, R. 1115; Ct. Dec. 74).

His third conclusion of law is couched directly in the words of this Court (Ct. Dec. 75-76).

More specifically, the Trial Court found on the subject of equivalents:

> "9. The materials have been completely reacted by the kiln treatment. The basic constituents are completely reacted by the time they leave the kiln. So, too, is the acidic constituent. Such reactions render the flux substantially anhydrous and free of gas-forming materials that would yield deleterious amounts of gas during welding (page 3, col. 1, lines 4-11). Moreover, such reacted acidic and basic materials are reacted with each other by the time they come out of the Lincoln kilns to an extent that the resulting flux contains a substantial amount of silicate.
>
> "10. There is sufficient silicate in the defendants' fluxes to accomplish the desired results, and they are substantially the same with respect to silicates as required by claims Nos. 18, 20, 22 and 23 of the Jones *et al.* patent. Such of the silicate-forming materials present in the finished fluxes as are not completely combined with each other to form silicates are, however, reacted to the extent required by the

> patent to eliminate gas-forming reactions and are, therefore, the equivalent of silicate for the purposes of claims 18, 20, 22 and 23'' (Findings 9, 10, R. 1114-15; Ct. Dec. 73).

Yet the Court of Appeals, in face of those findings, reversed.

Indeed, they go so far as to say that:

> ''There is no finding upon which this theory can be predicated, as Judge Dewey found on this point only that, 'There is sufficient silicate in the defendant's fluxes to accomplish the desired results . . .'.'' (Ct. Dec. 92-3).

That was, we submit, plain error on the face of the findings just quoted.

Equally plain is the fact that the Court of Appeals has completely missed the central point of the Trial Court's decision, misconceived the whole rationale of decision, particularly as regards equivalents.

In summarizing their reasons for rejecting Judge Dewey's decision the Court of Appeals said:

> ''Thus, it appears to us that the result reached by Judge Dewey rests upon the erroneous premise, (1) the scope of the invention was not confined to the patent claims; (2) even though defendants had not overstepped the bounds of the claims they had come 'too close to the patent'; (3) the accused fluxes are 'substantially the same' as the patented flux and infringe because of the sameness 'in their use and results' '' (Ct. Dec. 85).

On all three points they are wrong as is demonstrable from the face of Judge Dewey's opinion, findings and conclusions.

As to the effect of the claims in measuring scope the Court of Appeals quoted (Ct. Dec. 85) Judge Dewey's comment that

> "The *Jones et al.* invention is so broad and teaches so many new and additional features regarding electric welding that it seems to me the patent itself transcends in importance the compositions which are set out in the claims of the patent, and that the claims are in truth subordinate to the invention shown by the patent."

Here Judge Dewey was saying just what this Court said, that substance and not mere words should govern. Nor did Judge Dewey slight in any degree the effect of the claims as affording the basic point of reference to which all facts found must relate. Thus, his next sentence is:

> "However, the defendants claim that their compositions are substantially different from the claims which were held valid in the former proceedings, and consequently the patent is not infringed" (Ct. Dec. 65).

And in deciding against that contention a page later he says:

> "It may be said, in general, that each of the 700 series of defendants' fluxes operate substantially in the same manner and provide substantially the same results as a composition made in accordance with the claims of the patent."

And again after adverting (Ct. Dec. 66) to this Court's admonition that "It is the claim which measures the grant to the patentee," he says:

> "* * * I am satisfied the defendants' fluxes are composed of substantially the same ingredients as those set out in the claims * * *" (Ct. Dec. 67).

Reference to the "claims" runs throughout the findings and conclusions.

As to the Court of Appeals' accusation that Judge Dewey erroneously premised his finding of sameness of composition simply on sameness of use and result, suffice it to note that the reviewing court read his conclusion of law erroneously at the very point in issue. Thus, they say (Ct. Dec. 84):

> "Judge Dewey in his conclusions of law stated that the accused fluxes infringe because they do 'substantially the same thing,' * * *"

But that was a plain misquotation. Judge Dewey's conclusion actually said (Ct. Dec. 75):

> "In order for a welding composition or flux to infringe claims 18, 20, 22 and 23 of the Jones *et al.* patent, it must be substantially the same thing, * * *"

By substituting the word "do" for "be" at the beginning of their quotation, the Court of Appeals completely altered the sense on the very point they criticized.

It is true that Judge Dewey relied on proof of what the fluxes do as circumstantial evidence of what they are. He found it most useful to do so because of the conflict in direct evidence on the point. He, however, recognized plainly that proof of what the fluxes do would not alone suffice to establish what they are, saying:

> "There is a possibility, of course, that the defendants in the improvement of their weld have used elements which would result exactly the same as do the materials used in keeping with the claims of the patent. It is more probable as testified to by the plaintiff's experts that the application and treatment of heat to the starting materials caused such materials to be reacted and form silicates." (Ct. Dec. 67-8).

What it comes down to is that the Trial Court condemned, as a fraud upon the patent, a simple undercooking of the material. He held it to be an equivalent where the flux ingredients were all individually reacted, all chemically conditioned to display the properties described by the patent and the claims, but not heated quite enough to complete all of the potentially available reactions between themselves—and which would result in no corresponding change in properties (Findings 4, 5 and 6).

It was such a judgment that the Court of Appeals reversed on the verbalism of the claims.

The record is one, we submit, on which this Court should issue a writ to correct a plain failure to follow its decision on an important point of law.

POINT IV.

The Court of Appeals erred in basing its decision upon a false and non-existent issue of estoppel.

That the Court of Appeals lacked understanding of the nature and application of the doctrine of equivalents, is further shown by its acceptance of the false issue of estoppel proffered once again by defendants. This issue is introduced in the following passage in the Court of Appeals' opinion:

> "In the second Supreme Court decision (339 U. S. 605), notwithstanding the court's sweeping denunciation of one who practices a fraud upon a patent and the application of the doctrine of equivalents to the facts before it, there is little, if anything, in the opinion which affords an answer to our instant problem. We note, however, that the court again stressed the weight to be given a finding by the District Court

> on the issue before it and stated (page 609), 'A finding of equivalence is a determination of fact.' Plaintiff goes so far as to suggest that defendants' argument here is little more than a rehashing of that made to the Supreme Court. We do not so understand. There, the court held that the substitution by the defendants in their flux 660 of manganese silicate was the equivalent of the 'earth metal silicate' called for in the claims. It should be pointed out, however, and this is important, that there was no contention in that case that the patentee was estopped by its previous representations and activities from claiming that manganese silicate was the equivalent of the earth metal silicate called for in the claims." (Ct. Dec. 82-3)

The fact is that respondents did make this contention throughout the prior proceedings in this case. In every court respondents argued that plaintiff was estopped by its previous representations and actions from claiming that manganese silicate was the equivalent of the alkaline earth metal silicates called for in the claims. And this contention was rejected by every court to which it was made.*

In fact, until the recent decision of the Court of Appeals, not a single judge, of the many who sat on this case, found that this argument was even worth mentioning.

The important point is that the facts gave rise to no issue of estoppel. The Court of Appeals was led into error on this question by its failure to understand the import of the findings made by the Trial Court and the bearing of such

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* This contention was made at pp. 78-79 of defendants' first trial brief before Judge Swygert and Schriber-Schroth Co. *v.* The Cleveland Trust Co., 311 U. S. 211 (1940), was cited in support. This contention was rejected *sub silentio* by Judge Swygert.

This same contention was pressed again in the petitioner's Opening Brief upon Rehearing before this Court (p. 54 fn.). This Court made no mention of the contention in its decision.

findings upon an application of the doctrine of equivalents in accordance with principles laid down by this Court.

The ultimate issue before the Trial Court under the doctrine of equivalents, as defined by this Court, was factual:—whether respondents' renumbered Lincolnweld fluxes, in the light of the facts before the court, should be regarded as "substantially the same thing" as the patented compositions, made in accordance with the teachings of the patent and containing "a major proportion of alkaline earth metal silicates" or their equivalents.

In its opinion, the Court of Appeals devotes a substantial portion of its discussion (Ct. Dec. 85 *et seq.*) to a subsidiary issue of law—whether "a major proportion", as properly construed, can mean anything other than "over 50%". For the purposes of the present discussion it may be assumed, *arguendo,* that these words do mean "over 50%".

The point has no relevance to the correctness of Judge Dewey's decision, since nowhere in his opinion, findings of fact, or conclusions of law, did he indicate that he construed "a major proportion" any differently from the Court of Appeals. Indeed, Judge Dewey in his opinion indicated rather clearly that he adopted respondents' contention that these words should be construed as meaning "over 50%", although he refused to accept their further contention that such major proportion would have to consist of "manganese silicate" and nothing else, in order to justify holding respondents guilty of infringement (see Trial Court's opinion, Ct. Dec. 68).

There being, under such circumstances, no dispute as to the meaning of the words "a major proportion", the only remaining question was whether respondents' fluxes contain more than 50% of "alkaline earth metal silicates" or their equivalents.

The original infringing 660 flux contained substantially 90% of like-performing silicates. So too, in the presently accused fluxes substantially 90% is made up of such silicates together with individually reacted constituents of such silicates. That is to say, there has been simply a partial substitution of what the Trial Court found to be an "equivalent" (Findings 9 and 10; R. 1114, Ct. Dec. 73).

In both instances the construction, "more than 50%", was amply satisfied.

The premise underlying the Court of Appeals' entire discussion of this issue is that the only possible "equivalent" of the alkaline earth metal silicates is the "manganese silicate" already adjudicated as such an equivalent in the earlier stages of this case. That is why the Court of Appeals laid such stress upon the necessity of a finding as to the precise percentage of such "silicates" in the accused fluxes and, lacking such a finding by Judge Dewey, committed error by fabricating such a finding on the basis of its scanty knowledge of the record.

But in so doing the Court of Appeals went directly contrary to this Court's injunction that:

> "A finding of equivalence is a determination of fact. Proof can be made in any form: through testimony of experts or others versed in the technology; by documents, including texts and treatises; and, of course, by the disclosures of the prior art. Like any other issue of fact, final determination requires a balancing of credibility, persuasiveness and weight of evidence. It is to be decided by the trial court and that court's decision, under general principles of appellate review, should not be disturbed unless clearly erroneous. Particularly is this so in a field where so much depends upon familiarity with specific scientific problems and principles not usually contained in the general storehouse of knowledge and experience" (339 U. S. 609-10, Ct. Dec. 54).

The Trial Court, in its application of these principles, did not find it necessary to determine the precise percentage of manganese silicates in the accused fluxes, since they, together with other ingredients, reacted to the extent required by the patent (namely, to eliminate deleterious gas-forming reactions—cf. Finding of Fact No. 10, Ct. Dec. 73), constituted "a major proportion" of the welding composition.

In the light of this decision, the file wrapper estoppel argument, relied upon so heavily by the Court of Appeals in its decision, stands refuted by the very quotations from the file wrapper of the Jones *et al.* patent quoted in the Court of Appeals' opinion. Thus, as stated therein, the Severance patent was distinguished by the statement:

> "Therefore, Severance does not disclose nor suggest an electric welding composition in which an alkaline earth metal silicate or its equivalent constitutes the major portion of the composition. Even if the content of the pumice-stone and the dolomite or silicate are considered together, such ingredients still would constitute but a minor proportion of the entire compound" (Ct. Dec. 87).

If, unlike the Court of Appeals, one gives effect to the findings actually made by the Trial Court, there is no conflict whatsoever between that Court's application of the doctrine of equivalents and the patentee's distinction of Severance. Unlike Severance, respondents' accused fluxes are substantially the same thing as the patented welding compositions, because they contain a major proportion of "equivalents" of the alkaline earth metal silicates. Some, although not all, of this major proportion was found to consist of the adjudicated equivalent "manganese silicates", and this is conceded by respondents themselves. The remainder consists of ingredients treated in accordance

with the teachings of the patent—reacted so as to eliminate deleterious gas-forming reactions—and which were found by the Trial Court to satisfy each and every factual test set up by this Court as a means of determining whether or not a particular material qualifies as an "equivalent" of one literally covered by the claims of a patent.

All of the other quotations from the file wrapper made by the Court of Appeals and, as well, its review of a number of statements made on petitioner's behalf by its counsel, could be material only if "maganese silicate" were the exclusive "equivalent" of the alkaline earth metal silicates.

True, petitioner's counsel emphasized the teachings of Jones *et. al.* that reactions likely to cause deleterious evolutions of gas during welding must be completed prior to the welding operation. Such emphasis can scarcely be regarded as inconsistent with Judge Dewey's decision, since the learned Trial Court expressly found that respondents' renumbered Lincolnweld fluxes satisfy that very same requirement of the patent (see Findings 9, 10, 11; Ct. Dec. 73).

Lacking the expert knowledge gained by the Trial Court, who heard the witnesses and observed the welding demonstrations, the Court of Appeals was unable to appreciate the distinction made by Judge Dewey in finding that respondents' variant Lincolnweld fluxes, although they contained only a "substantial amount" of manganese silicate, were nevertheless "completely reacted" within the meaning of the Jones *et al.* patent and, moreover, contained a major proportion of "equivalents" of the alkaline earth metal silicates.

No better case than this could be found to illustrate the wisdom of this Court's statement that

> "Equivalence, in the patent law, is not the prisoner of a formula and is not an absolute to be con-

sidered in a vacuum. * * * Consideration must be given to the purpose for which an ingredient is used in a patent, the qualities it has when combined with the other ingredients, and the function which it is intended to perform" (339 U. S. 605, 609; Ct. Dec. 54).

POINT V.

The Court of Appeals disregarded the principle announced by this Court that infringement is not merely a matter of words but is one of substance.

The earlier decisions of this Court stand for the broad principle that infringement of a patent is a matter of substance and that the inventor is not to be put at the mercy of verbalism.

The second decision contained the following paragraph which goes to the heart of the matter:

> "But courts have also recognized that to permit imitation of a patented invention which does not copy every literal detail would be to convert the protection of the patent grant into a hollow and useless thing. Such a limitation would leave room for—indeed encourage—the unscrupulous copyist to make unimportant and insubstantial changes and substitutions in the patent which, though adding nothing, would be enough to take the copied matter outside the claim, and hence outside the reach of law. One who seeks to pirate an invention, like one who seeks to pirate a copyrighted book or play, may be expected to introduce minor variations to conceal and shelter the piracy. Outright and forthright duplication is a dull and very rare type of infringement. To prohibit no other would place the inventor at the mercy of verbalism and would be subordinating substance to form. It would deprive him of the benefit of his invention and would foster concealment

> rather than disclosure of inventions, which is one of the primary purposes of the patent system" (R. 17; Ct. Dec. 52).

Judge Swygert, after the first trial in 1947, made this all important statement with respect to the 660 flux:

> "• • • the lack of any evidence of independent research or experiments by the Lincoln Electric Company in originating Lincolnweld 660 flux creates an inference that the teaching of the patent in suit was the sole origin of that composition" (R. 17; Ct. Dec. 16).

In affirming the judgment, this Court expressly approved that statement (Ct. Dec. 45-46).

At the trial before Judge Dewey, there was ample evidence to establish the reckless and nakedly contemptuous attitude of the respondents toward the Court. For the present, the following will serve to illustrate the character of respondents' conduct.

There is the following remarkable coincidence of dates involving the two decisions of this Court:

> On February 28, 1949, this Court handed down its first decision—and just two days later, to wit, March 2, Lincoln sent out the test lots of the 780 flux.
>
> On June 1, 1950, this Court handed down its second decision after the reargument—and eleven days later, to wit, June 12, Lincoln sent out the test lots of the 760 flux.

Various letters and bulletins the Lincoln Company sent out to its organization establish beyond any possible controversy that it was the fixed purpose of respondent just to keep a step ahead of the Courts and have at least one new variation of its fluxes unadjudicated. As an example,

just a week after the first decision of this Court, Mr. Lincoln himself wrote letters to his organization where he referred to the adverse decision of this Court and said:

> "This means that before the end of the month we will have to stop making 660 flux.
>
> • • • • • •
>
> "Meanwhile it is your responsibility to get all of your customers changed over to 770 or 780 flux" (Pltf's Ex. P-43).

The respondent Graver sent Lincoln an order for 660 and received 780 in fulfillment (R. 157).

Although the Lincoln Company was marketing these new numbers right in the face of the adverse Court decisions, they obtained no outside opinion as to the chemical composition of the fluxes, nor did they have any X-ray diffraction tests or other mineralogical examinations made to see whether they were infringing (R. 710). The only person who purported to make any tests was their own engineer, Stringham, who was not qualified to make such tests and handled it in such a way that no record was kept of his tests (R. 709-715).

The undercooking to which respondents subject their accused fluxes costs more, not less, than full cooking (R. 971). Additional steps of material preparation are required (R. 967-969). Respondents' contention that it "smells better" to users hardly needs comment.

The only reasonable inference to be drawn is that the undercooking technique was adopted simply and solely as a tactic of patent evasion.

On the basis of extensive evidence, the Trial Court made the following finding of fact:

> "19. Defendants had full knowledge of the contents of the writ of permanent injunction issued by

> this Court on July 10, 1950 and violated such injunction either intentionally or with disregard of the rights of the plaintiff. Common sense should have told defendants that they were getting too close to the patent and that their fluxes were substantially the same in their use and result, as the compositions of the patents claims in suit" (R. 1115-16; Ct. Dec. 75).

During the colloquy upon the settlement of the findings of fact, Judge Dewey rejected respondents' request for a finding that they acted in good faith. The Court said:

> "I think it was most careless. I could not find that at all" (R. 1094).

and the Court further said:

> "You know, this law takes a long time, but you have to come to the end of the trail after a while" (R. 1102).

Respondents have translated their contempt for patents into a contempt for the judicial process which enforces them.

The writ should issue.

Respectfully submitted,

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April 15, 1952.

Office Supreme Court
FILED
APR 17 195
CHARLES ELMORE CR

IN THE

SUPREME COURT OF THE UNITED STATES

OCTOBER TERM 1951.

No. 714

UNION CARBIDE AND CARBON CORPORATION,
Petitioner.

vs.

GRAVER TANK & MFG. CO. INC., and THE LINCOLN ELECTRIC COMPANY,
Respondents.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE SEVENTH CIRCUIT

COURT DECISIONS.

Submitted with Petition and Brief for Petitioners.

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IN THE

DISTRICT COURT OF THE UNITED STATES

FOR THE NORTHERN DISTRICT OF INDIANA,
HAMMOND DIVISION.

THE LINDE AIR PRODUCTS COMPANY *vs.* GRAVER TANK & MFG. CO., INC., THE LINCOLN ELECTRIC COMPANY, and GRAVER TANK & MFG. CORPORATION.	No. 607 Civil.

[Decided June 6, 1947; reported 86 Fed. Supp. 191.]

The first question to be decided in this case is: Did the patentees [Patent No. 2,043,960] invent something patentable over the prior art of electric welding? If they did, two collateral questions arise: What constitutes their invention, and what are its boundaries?

The evidence on the first question is clear and convincing that Jones, Kennedy and Rotermund invented an important improvement in electric welding. Their method of welding differs vastly from electric-arc hand welding either of the bare rod or coated rod variety. Furthermore, an inventive-level difference exists between their method and the automatic welding method taught by Robinoff. The physical appearances surrounding the welding zone in the Jones, *et al.* method of welding differ from those in any of the prior methods of electric-arc welding. In bare rod and coated rod hand welding, the electric arc creates a blinding glare, and there is a great amount of smoke and splatter. In the Robinoff clay flux method constant flashings occur, and the arc is always at least partially visible. While in contrast to the appearances of those methods, there is no

glare, no open arc, no splatter, and very little, if any, smoke in the Jones, *et al.* method.

The truly remarkable difference, however, between what Jones, Kennedy and Rotermund invented and what had gone on before is perhaps best manifested by the performance achievements of their invention. For instance, only through its use can plates as thick as two and one-half inches be welded in a single pass. Furthermore, the welding speeds made possible by it dwarf those of any other method, and the welds produced by it are of the highest quality in contrast to the great amount of porosity contained in the welds produced by the so-called clay flux process.

Moreover, the commercial success of the Jones, *et al.* method is persuasive evidence that this method is an improvement over the prior known methods. It is true that this commercial success has been confined principally to the sale and use of Unionmelt No. 20 in contradistinction to other possible compositions taught by the patent. However, testimony by users of Unionmelt that the Jones, *et al.* method permits faster welding, saves costs and constitutes a vast improvement over hand welding is highly convincing that the method under inquiry is an invention.

Since the patentees did invent something patentable over the prior art of electric welding, the collateral questions of what constitutes their invention, and what are its boundaries, become pertinent.

To answer these questions a basic issue in this case must be decided. That issue is whether a fundamental difference in phenomena exists between the Jones, *et al.* method and all methods of electric arc welding. If it could be said without equivocation that the electric current passing between the electrode and the base metal travels through a welding composition which is in a melted or liquid state and that no "electric arc" is present, then a different electrical phenomenon would exist and a radically new process in electric welding would have been discovered. But no such finding can be made. The evidence is persuasive that no such basic difference in phenomena is present in the Jones, *et al.* method.

The inventors themselves did not initially conceive their invention as embodying any such radical departure from known phenomena. Historically, they saw the Robinoff clay flux process in operation at the Western Pipe and Steel Company. It was from that point in welding development that they began their experiments with welding compositions which they hoped would give a better weld than was being obtained by the Robinoff process, which undoubtedly involves an electric arc phenomenon. During the course of their experiments, they did evolve a composition or compositions which produced better welds. The operational use of their welding composition was the same as the clay flux in the Robinoff process; that is, from a purely operational standpoint, there was and is no difference between the Robinoff and the Jones, *et al.* methods. In both methods, a deep layer of flux or welding composition is laid in the V formed by the beveled edges of the plates to be welded; a bare welding rod is fed down through this composition; and an electric current, which produces the heat to weld the plates, is conducted from the rod to the base metal. Thus, the physical operational steps in the two methods are identical.

In their first application for a patent, the patentees designated their invention as an "Improvement in Method of Electric Arc Welding and a Flux Therefor." The specification of this application is replete with references to the presence and use of an electric arc in the new method. It was only after they had assigned their rights in the invention to the plaintiff that the suggestion of a basically new kind of phenomena other than an arc began to be made.

When a deep layer of the patented welding composition is used, there is no visual evidence of an electric arc after the initial welding operation has begun. What actually occurs between the electrode and the base metal is hidden from view by the surrounding granular flux. Because one cannot see what is actually happening beneath the top layer of the flux in the normal welding operation, it is impossible to say with complete certainty that there is or

is not an arc. Although some of the evidence submitted by the plaintiff indicates the presence of a phenomenon other than the electric arc, the plaintiff's expert witness, Dr. Doan, in effect admitted that the Jones, *et al.* process involves an arc phenomenon. I am in accord with the following appraisal of his testimony stated in defendants' brief:

> "We submit that Dr. Doan's answers to the Court's questions, when considered together with his last-quoted testimony, amply establishes the following facts. In hand welding with a metallic electrode, the arc is initiated by making contact between the end of the electrode and the plate. The arc is immediately established and the arc consists of an ionized gaseous medium through which the current flows with bare rod and no flux, ionized particles of the air participate in the conducting gaseous medium, and are not conducive to the production of sound weld metal. With the coated electrode, however, any initial and momentary participation of air particles is immediately replaced by the coating of the electrode in ionized vapor state and thereby the air is excluded, resulting in the production of sound metal. Dr. Doan admits that this produces an arc of entirely different characteristics. Yet it is still an arc. The only difference between it and the unshielded arc is the result of the coating on the electrode providing the shielding means. Identically the same thing takes place under a deep layer of flux. When the arc is initially established before the flux is vaporized, some air particles are present in the ionized gaseous medium. Immediately, however, the flux becomes vaporized, participates in and surrounds the arc zone, and shielding takes place to produce sound weld metal. Yet Dr. Doan claims this is not the same arc that was initially established. Neither is it the case of the hand electrode, but in both cases it is still an arc and as such conducts the current

from electrode to plate, and provides the requisite heat for the welding operation."

In addition to his oral testimony regarding the existence of an arc, Dr. Doan made this significant statement in his treatise entitled, "Conduction of Electric Current in an Ionized Gas or Liquid:"

> "In the welding process of the Jones *et al.* patent the welding rod is negative and the plate positive (or vice versa) with the pool of fused composition between them. All of the pool is "ionized." Current thus flows throughout the pool between rod and plate. The concentration of heat is greatest at the center or core of the pool, and the composition there is vaporized. The ions and electrons there having greater freedom of movement, a larger proportion of the current is made up of their charges. But throughout the pool, both in its vaporous core and surrounding liquid mantle, the mechanism of current conduction is basically the same, viz.: a progression of positive ions in one direction and of negative ions and electrons in the other."

Finally, I do not understand the plaintiff to dispute the view that its process involves the existence of an arc phenomenon. In its reply brief this concessionary statement appears:

> "Second, the process of the patent—there is contact, and a vaporous core or arc is entirely sealed in; * * * The fact is that (this) * * * is directly within the teachings of the patent and it is the actual operation which takes place in the Unionmelt and Lincolnweld processes."

Granted then that an arc exists, the question remains whether it has different characteristics than the arcs employed in the processes taught by the prior art of electric welding. Considering the phenomenon *per se,* it would

appear that the conduction of electric energy in an ionized element which is in a gaseous or vaporized state is common to all electric arcs. In that respect there is no difference between the arc in the Jones *et al.* process and any other arc. The difference is not in phenomena but in the element or elements constituting the "ionized" area of the arc operation and surrounding it. In bare rod welding, the dominant element in and around the arc is air. In covered rod welding, the fluxing material at least partially replaces the air. In the Robinoff clay flux method it is again the flux which at least partially replaces the air. In the Jones, *et al.* method, it appears that the vaporized area of ionization constituting the arc zone is entirely blanketed and shielded by a mantle of fused welding composition. It also appears that the arc area within this mantle is composed predominantly of vaporous welding composition.

The plaintiff contends that the submergence of the tip of the welding rod in the pool of fused flux is the key feature of the invention; or as stated in the argument, the unique feature is the contact of the welding rod with the fused pool of flux. If by this contention is meant that between the end of the welding rod and the vaporous arc zone there is an area of fused flux, it is not sustained by the evidence. Plaintiff's exhibit 173 is sufficient contradiction. What does seem evident is that the welding rod somewhere above its very end is in contact with, or rather is surrounded by, the pool of fused flux and that the arc zone, the vaporous ionized area between the end of the electrode and base metal, is sealed in by a sheath of molten flux in the form of a cap above the base metal and in part of this pool there is entwined fused molten metal. The positive and negative terminals of the electrode and the base plate are within this vaporous ionized area.

The distinctive characteristics of this arc zone, viz.: the dominant element making up the vaporous ionized area and the protective surrounding sheath of molten substance, can be attributed only to the peculiar properties of the welding composition which is employed. The mechanical operational steps involved are identical with those used by Robin-

off. Indeed, the patentees who started with the teachings of Robinoff merely sought an improved welding composition or flux to be used with his operational method. Their experiments dealt solely with welding composition and the type and amount of electric current to be used to effect their objective. They discovered what they sought—compositions which when employed in a welding operation taught by Robinoff give a vastly improved weld over Robinoff, which permit the welding of far thicker plates in a single pass and at a speed many times faster than attained by any prior known method, and which completely eliminate the splatter and blinding glare of the so-called open arc.

The collateral questions of what constitutes the invention and what are its boundaries have been answered only partially. The remaining part of these questions concerning what the welding compositions discovered by the inventors were, must await answer in the discussions of the validity of the patent in issue and of the question of infringement.

However, before taking up those discussions another matter must be treated. The inventors having discovered a new and useful welding composition that can be used successfully with the mechanical operations taught by Robinoff, the question of whether they also invented a new process of welding arises. When considered on the level of the apparatus and the mechanical manipulations employed in the process, the Jones, *et al* method is no different than that disclosed by Robinoff. Likewise, when considered from the standpoint of whether a new scientific principle or phenomenon is involved the Jones, *et al* method presents no new process. On the other hand, it does involve an arc phenomenon that is created in a different medium than that taught by Robinoff. It also involves an arc phenomenon that is encased in a mantle of molten flux as distinguished from the Robinoff method in which the arc is at best only partially sheathed in the clay flux. Accordingly, if the criteria for determining a new process are that it need not be limited to changes in physical operational manipulations nor be of such high order as to involve

fundamental changes in physical phenomena, then a new process is involved in this invention. Those, I believe are the criteria which the courts have used in determining the question of whether a new process has been discovered. The Supreme Court in *Cochrane* v. *Deener*, 94 U. S. 780, 788, laid down this definition of a patentable process.

> "A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing. If new and useful, it is just as patentable as is a piece of machinery. In the language of the patent law, it is an art. The machinery pointed out as suitable to perform the process may or may not be new or patentable; whilst the process itself may be altogether new, and produce an entirely new result. The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence."

The "certain substances," that is, the compositions used in the Jones, *et al.* method, are different from those used in the Robinoff method. A new result ensues, to-wit: an arc operating in different surroundings. Therefore, a new process of welding has been discovered.

The preceding paragraphs have been devoted mainly to the expression of determinations regarding the invention itself. It now becomes to construe the patent in light of those determinations.

It has been pointed out before that the patentees described initially their invention in terms of a new welding method, in which an arc process is involved. After their rights to a patent had been assigned, a change in theory of operation in the scientific principle sense began to be evolved. This shift of theory is quite evident from the three successive applications filed for this patent. The new theory advanced in the second and continued in the third application, but never unequivocably espoused, is that the

electric current passing between the electrode and the base metal flows through a conductive melt, that is through the flux, while it is in a melted state, rather than through a vaporous or gaseous medium such as occurs in an arc phenomenon. The defendants suggest this change in theory was evolved solely for patent coverage purposes. No direct finding to that effect can be made. However, it is significant that the idea of a radically different scientific principle came not from the inventors, but from plaintiff's patent solicitors.

That the initial idea of the inventors i. e., that they had an improved method of "submerged" arc welding, was never completely abandoned is evident from both the patent and the applications for it. For example, the patent recites: "Several circumstances show clearly that our process does not depend on the formation of an arc of the *usual* type." (Emphasis supplied.) To like effect, the second application states:

> "Applicants' specification has been slightly amended where it discusses the theory of their process, and compares this process with prior arc processes. It is immaterial to the patentability of the invention whether applicants are able to give the correct theory or not, but it is their purpose to give the examiner the fullest information in their possession on this matter. It is difficult, if not impossible, to define an arc precisely, and applicants have contemplated the possibility that a definition may be framed in such terms as to embrace the phenomenon which occurs in their process. There can be no question, however, that there is no such arc involved in their process as occurs in every prior arc process, including that of Robinoff, et al."

The patent's specification contains a sufficient disclosure of the method of welding invented to enable persons "skilled in the art" to accomplish the objectives by following the teachings outlined in it. This, in my opinion, is the test of this point of validity regardless of whether

an erroneous theory of operation is advanced. As stated in *Westinghouse Electric Mfg. Co.* v. *Montgomery E. L. & P. Co.*, 153 F. 890, 901:

> "The fact that the patentee did not fully understand the principle upon which his invention operated, or that his instructions were capable of a construction which would render the patent impracticable and defeat its purposes, should not deprive him of the benefit of a meritorious invention, provided it appears, as is found in this case, that the patent sufficiently disclosed to those skilled in the art the cause of the previous defects and a new and useful discovery and invention, by means of which they might be successfully overcome. He is not to be deprived of the benefit of his invention because he may have been mistaken in his statement of the reasons why the result was secured, or may have failed to correctly state the theory of their operation."

Specifically in regard to the validity of the claims in issue it first should be pointed out that claims 1, 3, 4, 7, 8, and 9 make no reference to the chemical constituents of the welding composition to be used in the novel process discovered by the patentees. It is evident that the welding composition discovered by the inventors is the heart of the invention. The specification, except for references to prior art and objectives, deals with the properties of and the method of preparing a new welding composition. Indeed, the patent recites, "The composition of the welding medium is of the utmost importance."

The welding compositions in these six process claims are described therein as follows: a "chemically stable fusible material having at welding temperatures substantially the fluidity and electrical conductivity of a fusible silicate," (Claim 1), "a fused nonmetallic material," (Claim 3), "a pool of nonmetallic material fused in situ," (Claim 4), "a finely divided unbonded nonmetallic material which is fusible at welding temperatures," (Claim 7), "unbonded particles of a prefused solidified and ground material capable

of refusion in situ and active when fused to cleanse the fused depositing metal of an electrode," (Claim 8), and a "pool of material fused in situ without substantial gas evolution, said fused material being electrically conductive and active to cleanse the fused metal of the electrode and the work," (Claim 9). Since these six claims make no reference in any manner to the identity of the composition except in these general terms, it is my view that they are too broad and indefinite. Therefore they are invalid because they do not comply with section 33 of Title 35 of the United States Code.

Process claims 5, 6, 11, 12, 13, 14, 15, 16 and 17 are invalid for another reason. The import of each of these claims is that the sole conductive medium through which the electric current passes from the electrode to the base metal is the welding composition which is in a molten state and that the electric arc phenomenon is not present. To make a claim for a welding process in which these erroneous ideas are incorporated is to stake out a process or means of welding which does not in point of fact exist within the invention. While a patent covering a meritorious invention should not be struck down because the patentee has misconceived the scientific principle of his invention, the error cannot be overlooked when the misconception is embodied in the claim.

Claim 2 recites that the method of welding invented "comprises supplying an electric current * * * substantially wholly through a pool of silicate fused in situ, without the formation of any substantial gas-conducted electric arc." This part of the claim implies that an arc other than a "substantial gas-conducted" one may be the means wherein the heat or energy for the welding is generated. Such a construction might save Claim 2 except that its validity is further dependent upon the sufficiency of its description of the welding composition.

In view of what has just been said regarding process Claim 2, it now becomes appropriate to decide whether the composition claims in issue are properly and validly drawn so as to afford the inventors a reasonable scope of protection for the welding compositions invented and disclosed by

them. In an early paragraph of their specification, the inventors state:

> "We have used calcium silicate and silicates of sodium, barium, iron, manganese, cobalt, magnesium, nickel, and aluminum, both in binary and ternary combinations, in various proportions. We have also used calcium titanate and various titano-silicates, these being used when it is desired to introduce titanium into the weld metal. While a number of these conductive welding compositions are more or less efficacious in our process, we prefer to use silicates of the alkaline earth metals, such as calcium silicate, and we also prefer to add to these silicates minor proportions of alumina and of a substance adapted to lower the melting point, for example, a halide salt."

Although in later paragraphs of the specification, the inventors point out that other materials such as borax and boric acid as fluxing agents and ferro manganese, ferro-silicon, ferrochromium, calcium molybdate, and carbon as materials inducible into the weld metal may be added to the welding composition, those materials are not essential to its successful operation but are simply optional to the accomplishment of functions other than the creation of a novel electric arc welding medium which is the essence of the invention under inquiry.

Despite defendants' arguments concerning the proper meaning of the clause "While a number of these conductive welding compositions are more or less efficacious in our process," a fair construction of it is that the invention includes compositions of those silicates mentioned and that the inventors found a number of them will accomplish the objectives of the patent more effectively than others of the group.

The inventors further state in this paragraph of specification that they prefer to use "silicates of the alkaline earth metals such as calcium silicate," and, in the next paragraph of specification, that their welding composition pref-

erably comprises as its principal ingredients "silica * * * at least one basic constituent of an alkaline earth such as lime * * * or magnesia * * * or a mixture thereof, and alumina * * *."

What is ordinarily meant by the alkaline earth metals are calcium, magnesium, barium and strontium. Two of these, lime (calcium oxide) and magnesia, are listed in the patent as preferred basic constituents. The patentees say that they have also used barium silicate, which fact is substantiated by Mr. Kennedy's oral testimony. The import of the evidence on this score is that barium can be substituted effectually for lime or magnesium in the composition taught by the inventors in their patent. It may be noted however, that the use of barium silicate as a welding composition is not commercially feasible because of its prohibitive cost. Although strontium is neither mentioned in the patent nor in the experimental notes of the inventors, the oral evidence is to the effect that it likewise can be used effectually as a basic component in the novel welding composition. Accordingly, in the light of these foregoing facts claims listing an alkaline earth metal silicate as a major constituent of the novel welding composition are valid if in other respects they meet the requirements of section 33 of Title 35, United States Code. It is my opinion that composition claims 18, 20, 22 and 23 meet those requirements and are valid claims.

Claim 27 reads in part, "A prefused electric welding composition which is conductive when molten * * *." Although that claim designates alkaline earth metal silicates as the principal constituents of the composition, the inevitable impression given by the quoted language is that the electric current passes solely through the composition while it is in a molten state. Accordingly, this claim is invalid for the same reasons mentioned in the discussion of process claims 5, 6, etc.

Neither claim 24 nor claim 26 is limited to alkaline earth metal silicates. The one claims a new fluxing material comprising "metallic silicate and calcium fluoride" and the other claims an electric welding composition consisting chiefly of "silicates." The evidence is clear and convinc-

ing that many silicates, even many metallic silicates, are inoperative as major constituents in a welding composition having for its objectives those stated in the patent. This central fact renders these broad claims invalid.

In its brief plaintiff asserts, "* * * two claims (*i. e.*, claims 24 and 26) make no reference to alkaline earth materials whatsoever, and must be construed specifically to cover all nine metallic silicates set forth in the specifications and their equivalents." The answer to this assertion is found in *Aluminum Co. of America* v. *Thompson Products Co., Inc.*, 122 F. 2d 796, 798. There as here, the patent owner asked to have broad claims narrowed by judicial construction to the scope of the invention disclosed in the specification. On that point the Circuit Court of Appeals for the Sixth Circuit said:

> "It urges upon us the application of the rule that claims must be read and construed in the light of the specification and so liberally interpreted as to uphold and not destroy the right of the inventor in the substance of his invention. Westinghouse E. & M. Co. *v.* Quackenbush, 6 Cir., 53 F. 2d. 632, and cases therein cited. We are of the opinion that the rule there applied is limited to claims that are ambiguous and so require construction, and is in no event applicable where it appears to be clear that the inventor sought a broader monopoly than would seem to be justified by his invention as he has described it. Wm. B. Scaife & Sons Co. *v.* Falls City Woolen Mills, 6 Cir., 209 F. 210; Union Switch & Signal Co. *v.* Kodel Elec. & Mfg. Co., 6 Cir., 55 F. 2d 173; In re Lowry, Cust. & Pat. App., 93 F. 2d 909; Cf. Kalle & Co. *v.* Multazo Co., 6 Cir., 109 F. 2d 321. In the first of the cited cases the general rule is clearly stated to the effect that a claim which is capable both of broad and narrow construction in the light of the specification will be given that construction which sustains the patent, but therein it is held that "where, from the specification or the history of the application or the language of the claim it is clear that the patentee intended to claim and the Patent

> Office intended to grant the broader monopoly which turns out to be invalid, the courts will not, for the arbitrary purpose of saving the claim, read into it a limitation which it does not have.
>
> "The appellant would have us interpolate into the defeated claims of its patent a limitation upon the silicon content of the patented alloy not there expressed. Not only are the claims held to be invalid without ambiguity, but it would appear to be clear that the inventor intended to claim the broader and not the more limited monopoly."

What has just been said about claims 24 and 26 applies equally to process claim 2.

Inasmuch as claims 18, 20, 22 and 23 are valid, the question of infringement becomes pertinent. Essentially the accused welding composition comprises manganese silicate to which has been added a small amount of calcium fluoride. The following comparison between the Unionmelt and the Lincolnweld compositions was made by Dr. Willard:

> "So we have here in one case (Unionmelt) a silicate of calcium and magnesium with a little aluminum, and with calcium fluoride, and in the case of Lincolnweld we have silicate of calcium and manganese with a little aluminum and calcium fluoride added."

The two compositions are identical in operation and the same kind of weld is produced by them. The mechanical methods in which these compositions are employed are essentially similar. A fair construction of the evidence is that Lincolnweld 660 flux can be substituted for Unionmelt Grade 20 without any change in operation or result except that Lincolnweld composition induces a greater amount of manganese into the weld metal. It is clear then that for all practical purposes, manganese silicate can be efficiently and effectually substituted for calcium and magnesium silicates as the major constituent of the welding composition.

Although manganese in its bivalent form has some characteristics of an alkaline earth metal, it is not classed

as such in chemical literature. Since the accused flux is composed principally of manganese silicate, it does not literally infringe composition claims 18, 20, 22 and 23. Whether it actually infringes these claims depends upon what application is made of the doctrine of equivalents. In that connection, no determination need be made whether it is a known chemical fact *outside* the teachings of the patent that manganese is an equivalent of calcium or magnesium. In the patent the inventors state, "We have used calcium silicate and silicates of sodium, barium, iron, manganese, cobalt, magnesium, nickel and aluminum, both in binary and ternary combinations, in various proportions." Thus, the fact that manganese is a proper substitute for calcium silicate as a major ingredient of the welding composition invented by Jones, Kennedy and Rotermund is fully disclosed in the specification of their patent. The defendants have urged a construction that would have the sentence in question read, "We have used calcium silicate *with* or *plus* silicates of sodium, etc." It is my view that the correct construction of the sentence is, "We have used calcium silicate and *also* silicates of sodium, etc." That this is the correct view is borne out by the first application. That document in part recites: "* * * and there are other materials suitable to form the main body of the flux. Magnesium silicate, manganese silicate or these in combination serve admirably. * * * Particular fluxes that we have used are as follows: * * * (2) manganese silicate $MnO.SiO_2$ * * *." Accordingly, it is concluded that the patent itself fully discloses that welding compositions composed chiefly of manganese silicate and prepared according to the teachings of the patent are equivalent to those in which the alkaline earth metals are the principal constituents.

In this connection, the lack of any evidence of independent research or experiments by the Lincoln Electric Company in originating Lincolnweld 660 flux creates an inference that the teaching of the patent in suit was the sole origin of that composition.

The defendants contend that if it be determined that the Lincolnweld composition containing a major proportion of manganese silicate infringes any of the composition

claims in issue, such claims have been completely anticipated by Miller Patents Nos. 1,741,031, 1,748,785 and 1,754,566, particularly the latter, which teaches the use of a manganese silicate coating in electric welding. But that Miller patent did not teach all that the Jones, *et al* patent does concerning an improved composition suitable for the welding method discovered by Robinoff. For example, that Miller patent reads in part:

> "Instead of performed manganese silicate the coating may contain material adapted to react at the temperature of the metal-depositing operation to produce manganese silicate. This is the preferred form of the invention as it permits one operation to be dispensed with. The coating may contain for example an oxide ore of manganese and any finely divided form of silica. As in the case of the preformed silicate, the proportions may be such that $MnO.SiO^2$ or a more basic or acidic silicate will be formed."

The patent in suit requires that the acidic and the basic constituents of the composition be prefused or reacted, for it states as follows:

> "The chemical condition of the welding composition or medium is important: the acidic and basic constituents should be reacted, the composition should be substantially anhydrous and free from gases and all reactions should would evolve deleterious amounts of gases during welding should be substantially completed, before the medium is used in the welding process."

Therefore, it cannot be said that the composition claims herein held valid are anticipated by the teachings of Miller.

The remaining issue in the case is the alleged misuse of the patent in suit by the plaintiff. The defendants contend that the plaintiff requires as a condition for a license that its licensees use unpatented weldrod furnished by it. In support of this contention typical forms of license agreements and rod purchase contracts used by the plaintiff were

introduced into evidence. Although the license agreements are separate documents from the rod purchase contracts, about ten percent of the existing license agreements and rod purchase contracts were executed on the same day by the licensee. Other documentary evidence indicated that the plaintiff instructs its sales force to avoid practices which could be interpreted by a prospective licensee as requiring him to execute a rod purchase contract as a condition of obtaining a license.

The defendants argue that the entire picture presented on this point indicates that a "tie in" requirement is imposed upon the licensee and that the plaintiff is doing by indirection what it may not do in a direct manner. This inference for which the defendants contend is not buttressed by evidence that any licensee has actually felt compelled to sign a rod purchase contract as a condition of obtaining his license.

A patent owner may legitimately engage in selling unpatented material usable with the patented article or process licensed by him, but he cannot legally require the licensee to purchase such material from him as a part of the licensing arrangement. Unless it could be found that plaintiff's entire licensing conduct is merely a subterfuge, it is hard to conceive what more plaintiff could have done to safeguard itself from charges of having unduly broadened its patent monopoly. The evidence does not warrant a finding that the plaintiff's licensing conduct is a subterfuge. Therefore, it is concluded that the defendants have not met the burden of proving that the patent has been misused.

Findings of fact and conclusions of law in accord with this opinion are herewith being signed and entered.

Counsel for the plaintiff shall submit a form of judgment and decree in conformity with the conclusions of law to defendants' counsel within ten days and to the Court within fifteen days from date.

/s/ Luther M. Swygert,
Judge.

Hammond, Indiana, June 6th, 1947.

IN THE

DISTRICT COURT OF THE UNITED STATES

FOR THE NORTHERN DISTRICT OF INDIANA,
HAMMOND DIVISION.

THE LINDE AIR PRODUCTS COMPANY *vs.* GRAVER TANK & MFG. CO., INC., THE LINCOLN ELECTRIC COMPANY, and GRAVER TANK & MFG. CORP.	Civil Action No. 607.

[June 6, 1947.]

FINDINGS OF FACT AND CONCLUSIONS OF LAW.

This action having been tried by the court without a jury, the court hereby makes the following findings of fact and conclusions of law:

FINDINGS OF FACT.

1. This is an action for infringement of United States Letters Patent No. 2,043,960, issued to Union Carbide and Carbon Corp., a corporation of New York, on June 9, 1936, for improvements in Electric Welding, upon an application of Lloyd Theodore Jones, Harry Edward Kennedy and Maynard Arthur Rotermund, filed October 9, 1935, as a continuation-in-part of prior applications Serial Nos. 657,836 filed Feb. 21, 1933 and 705,892 filed Jan. 9, 1934.

2. Plaintiff The Linde Air Products Company is a corporation of Ohio, and by assignment has been since June 10, 1936, and still is, the sole and exclusive owner of the entire right, title and interest in and to said patent.

3. Defendant The Lincoln Electric Company is a corporation of Ohio, and irrespective of any issue of jurisdiction, has openly assumed the defense of co-defendants Graver Tank & Mfg. Co., Inc., and Graver Tank & Mfg. Corp.

4. Defendant, Graver Tank & Mfg. Co., Inc., is a Delaware corporation. Defendant, Graver Tank & Mfg. Corp., is an Indiana corporation. The two Graver companies have a place of business within the Northern District of Indiana. It has been stipulated, solely for the purposes of this present action, that no distinction need be made between the respective acts of Graver Tank & Mfg. Co., Inc., and Graver Tank & Mfg. Corp. in whatever proofs plaintiff may offer in support of its charge of infringement in this action, and that any judgment which is entered in this action shall apply in all respects both as to injunctive relief, if any, and liability for accounting and award thereon, if any, to such two Graver companies, jointly and severally.

5. The motion picture (Plaintiff's Ex. 152) and the still photographs (Plaintiff's. Exs. 153-157) fairly represent the appearance of the following welding demonstrations by plaintiff:

Demonstration No. 1—Bare rod hand welding;

Demonstration No. 2—coated rod hand welding;

Demonstration No. 3—automatic welding with Unionmelt;

Demonstration No. 4—automatic welding with Unionmelt in contrast with clay flux welding;

Demonstration No. 5—clay flux welding as practiced by National Tube Company and Western Pipe & Steel Company.

6. The clay flux composition used with the Robinoff process at the Western Pipe & Steel Company evolved a large volume of gas during welding. Jones et al. concluded

that this gas caused the porosity in the clay flux welding. They determined they would avoid the evolution of gas in the welding operation by developing a welding composition in which all reactions were entirely completed by prefusing at a high temperature.

7. Jones et al. invented an improved welding composition usable in the operational method of electric welding taught by Robinoff. Their invention also included a novel welding process in the sense that the electric arc present between the electrode and base metal is sheathed by a mantle of molten welding composition and in that the conductive arc area is composed predominately of vaporous welding composition.

8. The performance capabilities of the invention represented an important advance in the welding art. These capabilities include:

a. welding plates 2½ inches thick at a single pass;

b. employing electric currents of 3000 amperes and more;

c. attaining welding speeds of 120 inches or more per minute;

d. producing welds of the highest quality.

9. Extensive commercial success has resulted from the exploitation of the invention by the plaintiff and its licensees. The welding composition principally used in attaining this success has been so-called Unionmelt 20 containing a major proportion of calcium silicate.

10. Compositions of calcium, magnesium, strontium and barium when prepared in accordance with the specification of the patent are operative as welding compositions within the teachings of the patent.

11. Calcium, magnesium, strontium and barium are the chemical elements which are known in chemical literature as the alkaline earth metals.

12. Manganese is not an alkaline earth metal.

13. Manganese silicate is one of the nine metallic silicates which the specification discloses that the inventors have used as principal constituents in welding compositions attaining more or less effectively the objectives of their invention.

14. The patent discloses that manganese silicate, when used as a principal constituent of a welding composition prepared according to the teachings of the patent, is a proper substitute for the silicates of the alkaline earth metals.

15. The composition of the welding medium is the essential feature of the invention. Process claims 1, 3, 4, 7, 8 and 9 make no specific reference to the chemical constituents of the welding composition to be used in the novel welding process which the patentees attempt to claim.

16. Process claims 5, 6, 11, 12, 13, 14, 15, 16 and 17 and composition claim 27 erroneously import that the sole conductive medium through which the electric current passes from the electrode to the base metal is the welding composition which is in a molten state and that no electric arc phenomenon is present.

17. Composition claim 26 and process claim 2 use the generic term "silicates" in describing the welding composition invented by the patentees. Composition claim 24 uses the limited generic term "metallic silicate" in describing the composition. Many silicates, even many metallic silicates, are inoperative as major constituents in a welding composition having for its objectives those stated in the patent.

18. Defendant, The Lincoln Electric Company, prior to 1942, experimented with and prepared to exploit the accused Lincolnweld composition. The first commercial

installation of the Lincolnweld composition was at the plant of the defendant Graver Companies in 1942, in East Chicago, within the Northern District of Indiana. The accused composition was used by all defendants at said plant. The Graver Companies are still using the Lincolnweld flux at said plant.

19. Defendant, The Lincoln Electric Company, has made, used and sold and continues to make, use and sell the accused Lincolnweld 660 flux.

20. The accused Lincolnweld flux and the composition of the patent in suit are substantially identical in operation and in result.

21. The accused Lincolnweld 660 flux is a calcium manganese aluminum silicate with calcium fluoride added, which in welding operation is in all respects equivalent to the compositions of the patent in suit. Said flux contains:

Constituent	Per Cent (by weight)
CaO	2.66
MnO	48.19
SiO_2	40.30
Al_2O_3	1.88
Fe_2O_3	1.33
CaF_2	3.92
TiO_2	0.10
MgO	0.60
BaO	0.87
S	0.02

22. A person skilled in the art can produce the accused Lincolnweld 660 flux by following the teaching of the patent in suit. No evidence was introduced to show that the accused flux was derived from the prior art or by independent experiment, or from any source other than the teachings of the patent in suit.

23. In the Lincolnweld 660 flux the slight excess of basic oxide over stoichiometric proportions does not substantially affect its operative character and follows the teaching of the patent.

24. The patent in suit teaches the substitution of manganese for other basic oxides and is not limited to the use of a moderate amount of manganese in addition to other basic oxides.

25. Composition claims 18, 20, 22 and 23 of the patent define invention over the prior art relied on by defendants.

26. In prior automatic electric welding processes and particularly in the Robinoff Process as commercially practiced by National Tube Co., at McKeesport, Pa., and by Western Pipe & Steel Co., at San Francisco, Calif., the following procedural steps have been employed:

(a) The plates to be welded are arranged with abutting edges which are beveled so as to form a V-shaped groove,

(b) Means for backing up the seam during welding are provided.

(c) The groove thus formed is filled with a welding composition in powdered or granular form.

(d) A mechanical device in the form of a welding head is mounted so as to be movable along the seam, such head including an automatic electrode feeding device whereby the electrode in the form of a rod or wire is drawn from a reel and fed toward the plates or work-pieces as the head thus moves along the seam.

(e) The welding operation is initiated by inserting the end of such electrode or wire into the welding composition, striking an arc, and then applying the power.

27. The procedural steps followed in the welding process taught by the patent are identical in all respects with those followed in prior automatic electric welding processes and particularly in such Robinoff Process, and the only novelty presented by the process of the patent resides in the use of a different welding composition in the carrying out of such procedural steps.

28. Plaintiff does not impose as a condition of a license under the patent in suit, nor does plaintiff otherwise impose on its licensees, any requirement, condition, agreement or understanding as to the purchase or use of any goods, wares, merchandise, machinery, supplies or other commodities; and the licensees are free to buy and use any materials and equipment from any source.

CONCLUSIONS OF LAW.

1. This Court has jurisdiction of the parties hereto and of the subject matter of this cause.

2. Claims 18, 20, 22 and 23 of the Jones, *et al. patent* No. 2,043,960 are valid.

3. Claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 24, 26 and 27 of the Jones, *et al.* patent No. 2,043,960 are invalid.

4. The defendants and each of them have infringed each of the claims 18, 20, 22 and 23.

5. The plaintiff has not been guilty of inequitable conduct and has not come into Court with unclean hands and is not barred from obtaining equitable relief.

6. Plaintiff is entitled to a permanent injunction against future infringement and threats of infringement of each of claims 18, 20, 22 and 23 of the Jones, *et al.* patent by each of the defendants and those controlled by any of them, and to an accounting for profits and damages, and to an assessment of costs against the defendants.

The Opinion filed herein shall be considered a part of these findings of fact and conclusions of law.

Dated: June 6th, 1947.

Enter:

LUTHER M. SWYGERT,
Judge.

IN THE

UNITED STATES CIRCUIT COURT OF APPEALS.

FOR THE SEVENTH CIRCUIT.

OCTOBER TERM, 1947, APRIL SESSION, 1948.

No. 9481.

THE LINDE AIR PRODUCTS COMPANY,
Plaintiff-Appellant,

vs.

GRAVER TANK & MFG. CO., INC., THE LINCOLN ELECTRIC COMPANY and GRAVER TANK & MFG. CORPORATION,
Defendants-Appellees.

No. 9482.

THE LINDE AIR PRODUCTS COMPANY,
Plaintiff-Appellee,

vs.

GRAVER TANK & MFG. CO., INC., THE LINCOLN ELECTRIC COMPANY and GRAVER TANK & MFG. CORPORATION,
Defendants-Appellants.

Appeals from the District Court of the United States for the Northern District of Indiana, Hammond Division.

April 16, 1948.

[Reported 167 F. 2d 531.]

Before SPARKS, MAJOR and MINTON, Circuit Judges.

SPARKS, Circuit Judge. Plaintiff charged defendants with infringement of United States Patent No. 2,043,960 issued June 9, 1936, to Union Carbide and Carbon Corporation of New York, assignee of the inventors Lloyd Theodore

Jones, Harry Edward Kennedy and Maynard Arthur Rotermund of California, who filed the patent application on October 9, 1935. The patent relates both to a process or method of electric welding, and to compositions for use therein. Of the process or method claims, numbered 1 to 17 inclusive, all were in issue except claim No. 10. Of the composition claims those numbered 18, 20, 22, 23, 24, 26 and 27 were in issue.

The defenses were invalidity and non-infringement. The court held valid and infringed composition claims 18, 20, 22 and 23, and invalid, composition claims numbered 24, 26 and 27. It also held all of the process or method claims in issue invalid. From the decree plaintiff, in cause No. 9481, has appealed from the rulings adverse to it, and the defendants, in cause No. 9482, have appealed from the rulings adverse to them.

The specification states with considerable particularity the disclosures of the art at the time, as patentees then understood them. We refer in substance to the specification in order to get a fair disclosure of the problems which then confronted the applicants, and which they sought to solve. The fact that the patent was issued clothes plaintiff with the presumption of its validity.

Among the various ways in which electrical energy had been converted into heat for welding metals, the arc process was the one most generally practiced, a typical example of which is its use to join the abutting edges of steel plates. In the metal-arc variation of the arc process, molten metal, provided by the melting of a metal wire or rod of suitable composition, was introduced between the abutting edges of the plates, and the latter were fused sufficiently to permit the added metal to coalesce with the metal of the plates so that, on cooling a structurally strong bond resulted. The requisite heat was developed by maintaining either a direct current or an alternating arc between the parts to be welded connected to one side of the power line, and the wire or rod used to supply the molten metal connected to the other side of the power line. The abutting plate edges were usually beveled to form a trough for receiving the molten metal,

thereby facilitating coalescence of the added metal with the plates throughout the thickness of the latter.

The simplicity of bare wire-electrode welding recommended it above all other methods, but the metallurgical and physical properties of metal deposited in this manner were usually so poor that the method was unsuitable for many applications.

In order to avoid certain difficulties encountered in bare metal arc welding, it was customary to protect the freshly deposited molten metal with a blanket of molten metal compounds (usually compounds of the alkali or alkaline earth metals). The material used for forming this blanket is called the "flux." The usual method of providing a flux blanket on the weld was to encase the welding rod or wire, referred to as the electrode, in an adherent sheath of solid flux, and this gave rise to other difficulties. The sheath was usually fragile and, being nonmetallic in nature, was non-conductive when cold, so that electrical connection was required to be made with the electrode at points bared for that purpose at intervals and at variable distances from the weld, thereby imposing an additional burden on the automatic regulating devices widely used in welding. When the bared sections reached the melting zone, metal of inferior quality was deposited. The current passed through a variable length of rod, the length between the arc and the contact point, heating it sufficiently to crack off the flux covering and further to add an IR-drop to the arc voltage. This IR-drop was not constant in magnitude but varied according to the position of the contact point relative to the arc. The machine could not maintain the constant arc length so necessary to successful welding unless compensatory means were resorted to. These difficulties therefore limited the energy which might be expended in the arc. The inventors were not aware of current values in excess of about 500 amperes being used in this manner of welding.

For good welding a homogeneous deposit of metal is indispensable. In metal-arc welding the difficulties in securing such deposit are multiplied as the thickness of the deposit increases, so that, in such case it becomes necessary

to make several traverses or passes, adding a layer of metal each time until the necessary thickness is attained. Such method is time and labor consuming.

Another known means of applying protective flux consisted in utilizing a thick coating of finely divided material, a flux, which covered the seam to be welded. The welding electrode which is a bare wire of suitable composition was fed down by conventional feeding means and the arc was struck under the powdered flux. The electrode was traversed at a constant rate along the path to be welded. Direct current was applied at a voltage of about 30 volts with a current up to about 900 amperes. The flux used in that system was a natural clay of approximately the composition used in making brick. Although this method retained the advantage of feeding current continuously to a bare wire at a point adjacent the weld, the weld metal thus deposited thereby was deficient in quality. A weld thus made had ample strength for some purposes, but it was quite porous, was not applicable to plates over one-half inch thick, and projected a cloud of material into the atmosphere, and often required the welders to use gas masks for protection from the dust.

The objects of the present invention are said to be to avoid the disadvantageous features above referred to; to provide a process by which thick plates can be strongly and rapidly electrically welded in a single pass or in a plurality of passes, with a weld of which the density and physical properties are at least equal to those of the parent metal; to provide a process in which heavier welding currents can be used and the rate of welding accelerated; to overcome the difficulties which, in prior processes, are caused by the inherent instability of an electric arc, and its liability to be extinguished by a variety of causes; and to avoid the necessity for a flux sheath on the electrode.

It is said that the patent discloses a novel process for electric welding wherein the necessary heat is generated by the passage of a heavy electric current between a metal electrode (usually bare) and the metal plates or similar objects to be welded, the electrode being out of mechanical

contact with the objects, and the current being carried across the gap between the electrode and the object by and through a conductive melt or welding composition having appropriate electrical resistance properties. The heat thus generated melts successive portions of the electrode, and the molten material is deposited as weld filler material. The welding composition serves as an active instrumentality or welding medium, inasmuch as it provides heating means, controls the rate, penetration and quality of welding, and purifies and protects the molten metal.

The specification states that the properties of a successful welding composition for this method are: (1) The chemical reaction between the components of the welding composition must be completed before it is used in welding (failure in this regard produces porosity); (2) it must be capable of controlling the penetration and the width of the weld; (3) its fluidity at welding temperatures must be such that it will not become entrained with the molten metal; (4) it must consist of chemicals which are not detrimental to the properties of the steel; and (5) it must be readily removable from the finished weld.

The composition of the welding medium is of the utmost importance. The particular composition that is to be used is determined by the quality and thickness of the metal plates to be welded, by the current and voltage to be used, and by the properties it is desired to impart to the weld metal.

The inventors state in their specification that they have used calcium silicate and silicates of sodium, barium, iron, manganese, cobalt, magnesium, nickel and aluminum, both in binary and ternary combinations, in various proportions. They state also that they have used calcium titanate and various titano-silicates, particularly when they desired to introduce titanium into the weld metal. They further state that a number of these conductive welding compositions are more or less efficacious in this process, but it is preferred to use silicates of the alkaline earth metals, such as calcium silicate, and they also prefer to add to these silicates minor

proportions of alumina and of a substance adapted to lower the melting point, such as a halide salt.

The preferred composition, however, comprises as its principal ingredients, silica, at least one basic constituent consisting of an alkaline earth such as lime or magnesia or a mixture thereof, and alumina.

The silica and basic constituent are in approximately the proportions theoretically required to form metasilicates, although a substantial excess of silica is permissible and frequently advisable. For example, if the basic constituent is lime, the proportions by weight would be approximately from 0.7 to one part of lime to one part of silica; and if magnesia is substituted for part or all of the lime, the silica is increased accordingly, so as to maintain about the same stoichiometric proportions. The alumina forms about 1% to 8% of the weight of the welding composition, and preferably about 4% to 6%. In order to cause the energy to be distributed over a larger area there is added, in various minor proportions, say 6%, a material capable of reducing the energy concentration and thereby widening the weld. The preferred material for this purpose is a halide salt such as calcium fluoride.

The basic constituent preferably consists chiefly of lime and magnesia in approximately the proportions of three parts of lime to one part of magnesia, by weight, but other proportions are useful and within the invention. Basic materials other than lime or magnesia, for example oxides of manganese, titanium, or the alkali metals, and known fluxing agents such as borax or boric acid, may be added in moderate amounts without greatly changing the essential characteristics of the composition, but it is important that the composition be substantially free from iron oxides uncombined with other ingredients of the composition (by being prefused with such ingredients) and from materials (such as carbonates or moisture) which evolve detrimental amounts of gas or vapor at welding temperatures. The material when ready for use to form the conductive melt is said to be the principal feature of the process.

The chemical condition of the welding composition is important. "The acidic and basic constituents should be reacted, the composition should be substantially anhydrous and free from gases, and all reactions which would evolve deleterious amounts of gases during welding should be substantially completed, before the medium is used in the welding process." These conditions are attained by prefusing a mixture of the constituents. Certain relatively volatile but chemically stable constituents, such as calcium fluoride, may be added to the medium either before or after the other ingredients have been fused and cooled. The carbonates of calcium or magnesium may be substituted for the oxides, if the ingredients are prefused.

It is also said that the physical condition of the welding composition is of the utmost importance. If the molten medium is rapidly solidified by cooling before grinding and use, more homogeneous and solid welds may be produced than when it slowly loses heat and solidifies. The fused composition is preferably cast as a relatively thin layer against efficient cooling or chilling means such as a cold heavy plate or block of metal, or a water-cooled chill plate, rather than as a large ingot. It is preferred that the rate of cooling be such that substantially all of the solidified welding composition is characterized by a vitreous fracture.

In practicing the process the plates to be welded are arranged as for metal open arc welding. The edges are preferably beveled, but this is less necessary than with arc welding because the "penetration" and width of the weld is dictated by the composition of the flux and the voltage and current employed, and can be closely controlled by the process.

When a weld is to be made between beveled edges, the operation is started by filling the groove, space, or gap between the edges of the objects with the welding composition, preferably in powdered or granular form, and a substantial and additional quantity of the composition is heaped up along the groove, thereby overfilling it. After the weld is completed, that portion of the composition which has not been fused may be removed, and that portion which has been

fused may be lifted from the weld. The fused material may be reground and reused in some instances.

Pursuant to the method prescribed, the end of the welding electrode, which is preferably bare metal, is first inserted into the welding composition. Since the latter is non-conductive when cold, a conductive path for the welding current is provided by bridging the gap between the electrode and the work with a silver of graphite or a wad of steel wool. The power is then applied, the welding composition is locally heated until it fuses and becomes conductive, forming a subsurface pool, and immediately thereafter the end of the electrode begins to fuse and the molten metal begins to deposit in the groove, displacing the subsurface pool of fused welding composition. At the same time the edges of the object being welded being to fuse and to coalesce with the deposited metal. The electrode is then fed toward the work and moved along the seam at an appropriate rate preferably by a mechanical device which may be similar to those which are extensively used in open arc welding, and the welding proceeds without interruption under a protective layer of the composition. There is practically no puffing or visible displacement of the welding medium, no visible sparking and scarcely any external evidence that the weld is being made. The weld is ordinarily completed in one pass, even in thick plate. The welding composition in front of the electrode remains unfused, while the fused composition rises to the top of the completed portion of the weld and solidifies. This effect is scarcely visible because of the use of an excess of the welding composition which remains unfused and covers the fused composition and metal.

Either alternating or direct current, or direct current superimposed on alternating current may be used, but alternating current is preferred.

The application states that the process here employed does not depend on the formation of an arc of the usual type:

> "* * * If, while a weld is being made, the circuit is opened externally of the weld and then closed again while the resistive composition is still molten,

> the current will immediately resume its flow without any necessity for moving the electrode into contact with the seam as it would be necessary to do to reestablish an arc of the usual type. The heat for melting the electrode is evidently developed in the conductive melt itself.
>
> "The conductive welding composition used in our process doubtless performs the protective functions of a flux, but it is much more than a flux, and many compositions which are satisfactory fluxes for arc welding are unsuitable for our purpose. • • •"

The District Court said, and we think rightly, that Jones, Kennedy and Rotermund invented something patentable over the prior art of electric welding. He thought their method of welding differed vastly from electric-arc hand welding, either of the bare or coated rod variety, and that there was "an inventive level-difference" between their method and Robinoff's automatic welding method. He calls attention to the differences in the physical appearances in the welding zones of the patent, and those of any of the prior art during their operations. "In bare rod and coated rod hand welding, the electric arc creates a blinding glare and there is a great amount of smoke and splatter. In the Robinoff clay flux method constant flashings occur, and the arc is always at least partially visible." In those of the patent "there is no glare, no open arc, no splatter, and very little, if any smoke, • • •. The truly remarkable difference, however, between what Jones, Kennedy and Rotermund invented and what had gone before is perhaps best manifested by the performance achievements of their invention. For instance, only through its use can plates as thick as two and one-half inches be welded in a single pass. Furthermore, the welding speeds made possible by it dwarf those of any other method, and the welds produced by it are of the highest quality in contrast to the great amount of porosity contained in the welds produced by the so-called clay flux process."

Having thus determined that there was patentable invention, the court then proceeded to determine what was patentable, whether process or composition or both. As to the method he posed the question "whether a fundamental difference in phenomena exists between the Jones, et al. method and all methods of electric arc welding. If it could be said without equivocation that the electric current passing between the electrode and the base metal travels through a welding composition which is in a melted or liquid state and that no 'electric arc' is present, then a different electrical phenomenon would exist and a radically new process in electric welding would have been discovered. But no such finding can be made. The evidence is persuasive that no such basic difference in phenomena is present in the Jones, et al. method."

We construe this statement to mean that the court thought the invention as to method, would have been patentable if it had disclosed that there was no arc present, and that the electrical current passing between the electrode and the base metal traveled through the welding composition, *only* when such composition was in a melted or liquid state.

With respect to this point, the court in substance said that in the inventors' experiments it was hoped by them to give a better weld than was being obtained by the Robinoff process, which involved an electric arc phenomenon. During the course of their experiments, they evolved a composition which produced better welds. However, he said in substance that the purely operational use of their welding composition was the same as the clay flux in the Robinoff process, and there was and is no difference between the Robinoff and Jones and other methods. In both methods a deep layer of flux or welding composition is laid in the V formed by the beveled edges of the plates to be welded; a bare welding rod is fed down through this composition; and an electric current which produces the heat to weld the plates is conducted from the rod to the base metal. Thus, the court said, the physical operational steps in the two methods are identical.

Plaintiff's appeal is taken from so much of the decree as held invalid claims 1 through 9, and 11 through 17, and

claims 24, 26 and 27. The court considered these claims in four groups, and as a matter of convenience we shall do likewise.

Claims 1, 3, 4, 7, 8 and 9 were held to be invalid because they were too broad and indefinite to satisfy the statute, that is to say, because they were said to make no reference to the chemical constituents of the welding compositions. These were not claims to a composition of matter or chemical compound but they were all process or method claims as expressed in finding number 7:

> "Their invention also included a novel welding process in the sense that the electric arc present between the electrode and base metal is sheathed by a mantle of molten welding composition and in that the conductive arc area is composed predominantly of vaporous welding composition."

There the court correctly described the alleged novel process without in any way referring to any chemical composition.

We think it was unnecessary in a process claim to refer in any way to the chemical constituents of the composition where, as here, they are fully set forth in the specification. We think this view is fully supported in principle by the Telephone Cases, 126 U. S. 1; Union Oil Co. of California *v.* American Bitumuls Co., 109 F. 2d 140; Van der Grinten *v.* Dieterich-Post Co., 85 F. 2d 637; and Glade *v.* Walgreen Co., 122 F. 2d 306.

Furthermore, these claims now under consideration seem to be sufficiently definite when construed in the light of the specification. The statute merely states that the claims should particularly point out and distinctly claim the part, improvement, or combination which the applicant claims is his invention or discovery. 35 U. S. C. A. section 33. It would seem that this statute only requires that the claims point out the invention, not that they redescribe it.

The court's reason for holding invalid process claims 5 and 6, and 11 through 17, is set forth.

> "* * * The import of each of these claims is that the *sole conductive medium* through which the electric current passes from the electrode to the base metal is the welding composition which is in a *molten* state and that the electric arc phenomenon is not present. * * * While a patent covering a meritorious invention should not be struck down because the patentee has misconceived the scientific principle of his invention, the error cannot be overlooked when the misconception is embodied in the claim." (Our emphasis).

Claim 6 is typical.[1]

None of these nine claims refer in any manner to the presence or absence of an arc, either directly or by reasonable inference. The reason is that the applicants did not know, and they carefully avoided any commitment on that subject. There was no visible evidence of its presence, and for that reason it was impossible for them to determine that scientific fact, nor was it incumbent upon them to do so. The file wrapper discloses that the applicants said to the Examiner:

> "It is difficult, if not impossible, to define an arc precisely, and applicants have contemplated the possibility that a definition may be framed in such terms as to embrace the phenomenon which occurs in their process.
>
> "There can be no question, however, that there is no such arc involved in their process as occurs in

[1] "The process of electric welding which comprises the steps of juxtaposing a metal electrode and a conductive member on which metal is to be deposited; establishing between said member and said electrode a conductive melt comprising an alkaline earth metal silicate, alumina, and an alkaline earth metal fluoride, substantially free from substances, such as uncombined iron oxide, capable of evolving gases when fused in contact with the metal to be welded; passing through said melt an electric current of sufficient magnitude to maintain the conductivity, progressively melt the said electrode and cause the resulting molten metal to coalesce with said member; and maintaining said melt in contact with said electrode and member throughout the welding operation."

every prior art process including that of Robinoff, et al."

We are convinced that the District Court also erred in its statement, which we have quoted, to the effect that the import of these claims is that the *sole conductive medium* through which the electric current passes to the base metal is the welding composition which is in a *molten* state. This no doubt occurred through its interpretation of the phrase "conductive melt," coined by the inventors to identify their welding compositions. This interpretation, if correct, would preclude the existence of such compositions in vaporous form. It is clear that in this respect the court should adopt the same interpretation of the term "conductive melt" which the applicants reasonably expected it to have when they coined it. It is clear to us from its context in the patent, and the circumstances of its origin clearly indicate that the applicants intended the phrase to mean, when heated to welding termperatures, in either liquid or vaporous state.

This construction is quite consistent with the views expressed by experts of both plaintiff and defendants; with the Welding Handbook of the American Welding Society, and with Webster's New International Dictionary since 1936, which defines "fluid" to mean "liquid or gaseous." The specification expressly states "that the relatively high current densities which are preferably used superheat the molten metal and welding composition, making them highly fluid."

The District Court held composition claim 27 invalid because it contained the words "a prefused electric welding composition which is conductive when molten * * *." The court, as before, thought that these words gave the inevitable impression that the electric current passes through the composition only while it is in a molten state. From what we have just said with respect to the last method claims, we think the holding was erroneous, and the same may be said with respect to process claim 1.

The District Court held process claim 2 and composition claims 24 and 26 invalid on the ground that a number of

silicates had been shown to be inoperative. The composition is described as a silicate in process claim 2, as a metallic silicate and calcium fluoride in composition claim 24, and as consisting chiefly of silicates in composition claim 26. It rejected plaintiff's contention that "silicates" and "metallic silicates," when read in the light of the specifications, meant the nine metallic silicates which had been proved operative. The court based its ruling upon *Aluminum Company of America* v. *Thompson Products, Inc.*, 122 F. 2d 796. We fully agree with what is there said. However, there is nothing in this record to support the fact that the applicants for this patent intended by these claims to assert any monopoly broader than nine metallic silicates named in the specifications. Under these circumstances, we think the court should have applied the general rule as laid down in the case just referred to and followed the construction which would sustain them.

It is only when these claims last referred to are read alone, without regard to the rest of the patent, that the terms "silicates" and "metallic silicates" can be construed as meaning all "silicates" or all "metallic silicates". It seems clear to us that when the patent is read as a whole it is quite plain that these terms refer to the three outlined earth silicates plus the six other metallic silicates listed in the specifications as their equivalents. We think the court should have held valid the process claim 2 and composition claims 24, 26 and 27.

The only issues involved in defendants' appeal are the validity and infringement of composition claims 18, 20, 22 and 23. The latter is typical.[2]

Plaintiff's process was quite different from that of the prior art disclosures in that the latter depended on the evolution of more gas to protect the molten metal, while

[2] Claim 23. "A finely-divided unbonded fusible composition for use in electric welding employing a bare metal electrode as a source of weld metal, said composition being substantially free from substances capable of evolving a detrimental quantity of gas under welding conditions and containing calcium fluoride and a major proportion of one or more alkaline earth metal silicates."

plaintiff's proceed on the theory of eliminating all gas forming ingredients. That difference is clearly one of process. True, plaintiff's process contemplated and depended upon a different composition of flux, and the patent was issued on both process and flux composition, and we think rightly so. There are as many different kinds of flux as there are elements and combinations of elements, and when thus used their results are quite as numerous. However, this patent was not granted upon a result, but it was granted upon a process or method which produced a much desired result, and which was then unknown to the art. Any other process or method which produces the same result would not infringe this process patent, provided it does not use this method or its equivalent, and this would be true regardless of what flux, if any, was used for such purpose.

The court found that the patent included a novel welding process in the sense that the electric arc between the electrode and base metal is sheathed by a mantle of welding composition and that the conductive arc area is composed predominantly of vaporous welding composition; that the capabilities of the invention represented an important advance in the welding art; that compositions of calcium, magnesium, strontium and barium, when prepared in accordance with the specification, are operative as welding compositions within the teachings of the patent; that these elements are known in chemical literature as alkaline earth metals; that manganese is not an alkaline earth metal; that manganese silicate is one of the nine metallic silicates which the specification discloses that the inventors have used as principal constituents in welding compositions attaining more or less effectively the objectives of their invention; that manganese silicate when used as a principal constituent of a welding composition, prepared according to the teachings of the patent, is a proper substitute for the silicates of the alkaline earth metals.

The court further found that the defendants used and sold their accused composition since 1942, and are still using it, and it is substantially identical in operation and result

with that of the patent; and that such flux is a calcium manganese aluminum silicate, with calcium fluoride added, which in welding operation is in all respects equivalent to the compositions of the patent; that a person skilled in the art can produce the accused flux of the defendants by following the teaching of the patent in suit; that no evidence was introduced to show that the accused flux was derived from the prior art or by independent experiment, or from any source other than the teaching of the patent in suit. It was further found that in the defendants' flux the slight excess of basic oxide over stoichiometric proportions does not substantially affect its operative character and it follows the teaching of the patent; that the patent teaches the substitution of manganese for other basic oxides and is not limited to the use of a moderate amount of manganese in addition to other basic oxides.

The court further found that plaintiff does not, as alleged by the defendants, impose as a condition of the license under the patent in suit, nor does it ever impose on its licensees any requirement, condition, agreement or understanding as to the purchase or use of merchandise, machinery or supplies or other commodities; and the licensees are free to buy and use any materials and equipment from any source. These questions of fact are supported by substantial evidence and we may not disturb them.

We find no error in the court's ruling on the issues raised by the cross-appeal. We affirm so much of the District Court's decree as holds valid and infringed claims 18, 20, 22 and 23. We reverse that part of his decree which holds invalid all of the process or method claims in issue, and composition claims 24, 26 and 27. The cause is ordered remanded to the District Court for further proceedings not inconsistent with this opinion.

SUPREME COURT OF THE UNITED STATES

NOS. 184 AND 185.—OCTOBER TERM, 1948.

GRAVER TANK & MFG. CO., INC., THE LINCOLN ELECTRIC COMPANY, and GRAVER TANK & MFG. CORPORATION, Petitioners, 184 *v.* THE LINDE AIR PRODUCTS COMPANY.	On Writs of Certiorari to the United States Court of Appeals for the Seventh Circuit.
GRAVER TANK & MFG. CO., INC., THE LINCOLN ELECTRIC COMPANY, and GRAVER TANK & MFG. CORPORATION, Petitioners, 185 *v.* THE LINDE AIR PRODUCTS COMPANY.	

[Decided February 28, 1949; reported 336 U. S. 271.]

MR. JUSTICE JACKSON delivered the opinion of the Court.

Writs of certiorari have been granted, 335 U. S. 810, to review two judgments of the Court of Appeals for the Seventh Circuit involving the same patent. What we shall call the Jones patent was No. 2,043,960, issued to Lloyd Theodore Jones and others for an electric welding process and for fluxes, or compositions, to be used therewith. The patent is now owned by The Linde Air Products Company, which brought an action for infringement against the Lincoln and two Graver companies.

The District Court held four of the flux claims valid and infringed and concluded that the patent owner had not misused the patent so as to forfeit its claims to relief

therefor. It held certain other flux claims and all of the process claims invalid. 75 U. S. P. Q. 231.

The Court of Appeals affirmed the findings that four flux claims were valid and infringed and that the patent had not been abused, but reversed the trial court and held valid the process claims and the remaining contested flux claims. 167 F. 2d 531.

The petitioners contend not only that the Court of Appeals' judgment should be reversed, but that we should also reverse the District Court's finding of partial validity and should declare the patent entirely invalid and not infringed.

At the trial the electric welding prior art and the nature of the Jones invention were explored at length, and opinions of the two courts below, already in the books, adequately discuss the technology of that art and the scientific features of the claims involved. We shall confine this opinion to a statement of the legal principles which lead to our decision.

I. Flux Claims 18, 20, 22 and 23, Held Valid, and Infringed, By Two Courts Below.

Electric welding was an established art before this invention but one with serious limitations which the industry sought to overcome. The known method was slow and laborious and permitted welding of only relatively thin plates. It was of different types, but each had such deficiencies as a dazzling open arc, smoke and splatter, which made operation unpleasant and somewhat hazardous.

Three scientifically trained individuals, Jones, Kennedy and Rotermund, set out purposely to discover a cure for the deficiencies and inadequacies in the method of flux welding, then the most successful method known. They collaborated for some six months in conducting a series of about 500 experiments in the course of which they compounded 75 different flux compositions. They finally produced the invention for which a patent was sought.

The trial court noted that the results produced by their invention contrasted with those possible under all prior methods in that "there is no glare, no open arc, no splatter, and very little, if any, smoke in the Jones, *et al.* method."

> "The truly remarkable difference, however, between what Jones, Kennedy and Rotermund invented and what had gone on before is perhaps best manifested by the performance achievement of their invention. For instance, only through its use can plates as thick as two and one-half inches be welded in a single pass. Furthermore, the welding speeds made possible by it dwarf those of any other method, and the welds produced by it are of the highest quality in contrast to the great amount of porosity contained in the welds produced by the so-called clay flux process."

The trial court continued: "Since the patentees did invent something patentable over the prior art of electric welding, the collateral questions of what constitutes their invention and what are its boundaries become pertinent." He concluded that what was really invented was that which was claimed and bounded by the composition claims Nos. 18, 20, 22 and 23. His findings and conclusion were affirmed by the Court of Appeals. We are now asked to hold that there has been no such invention.

Rule 52 (a) of the Federal Rules of Civil Procedure provides in part: "Findings of fact shall not be set aside unless clearly erroneous, and due regard shall be given to the opportunity of the trial court to judge of the credibility of the witnesses." To no type of case is this last clause more appropriately applicable than to the one before us, where the evidence is largely the testimony of experts as to which a trial court may be enlightened by scientific demonstrations. This trial occupied some three weeks, during which, as the record shows, the trial judge visited laboratories with counsel and experts to observe actual demonstrations of welding as taught by the patent

and of the welding accused of infringing it, and of various stages of the prior art. He viewed motion pictures of various welding operations and tests and heard many experts and other witnesses. He wrote a careful and succinct opinion and made findings covering all the factual issues.

The rule requires that an appellate court make allowance for the advantages possessed by the trial court in appraising the significance of conflicting testimony and reverse only "clearly erroneous" findings. These are manifestly supported by substantial evidence and the Court of Appeals found them supported by the weight of the evidence—indeed found the evidence to warrant support of the patent even in matters not found by the trial court. A court of law, such as this Court is, rather than a court for correction of errors in fact finding, cannot undertake to review concurrent findings of fact by two courts below in the absence of a very obvious and exceptional showing of error. *Goodyear Tire and Rubber Co.* v. *Ray-O-Vac Co.*, 321 U. S. 275; *District of Columbia* v. *Pace*, 320 U. S. 698; *Williams Mfg. Co.* v. *United Shoe Machinery Corp.*, 316 U. S. 364; *Baker* v. *Schofield*, 243 U. S. 114, 118.

No such showing is made. While the ultimate question of patentability is one of meeting the requirements of the statute, R. S. § 4886, as amended, 35 U. S. C. § 31, the facts as found with respect to those four flux claims warrant a conclusion here that as matter of law those statutory requirements have been met. Accordingly, we affirm the judgment insofar as it holds claims numbered 18, 20, 22 and 23 define an invention for which patent has validly issued.

Turning to the question of infringement, the District Court found that the Lincoln Electric Co. made, and the other petitioners used and sold, a flux substantially identical with that set forth in the valid composition claims of the patent in suit and which could be made by a person skilled in the art merely by following its teachings. The petitioners introduced no evidence to show that their

accused flux was derived either from the prior art, by independent experiment or from any source other than the teachings of the patent in suit. The court found infringement of each of the four claims and concluded that the respondent was entitled to a permanent injunction against future infringement and to an accounting for profits and damages. These findings and conclusions were affirmed by the Court of Appeal and we find no cause for reversal.

II. Flux Claims Held Invalid By the District Court and Valid By the Court of Appeals.

The District Court held invalid claims to a flux for use in the process, numbered 24, 26 and 27. The Court of Appeals reversed as to these and held them valid. Remaining flux claims, numbered 19, 21, 25, 28 and 29, were not in issue, and claim 27 we consider along with the process claims.

The difference between the District Court and the Court of Appeal as to these findings comes to this: The trial court looked at claims 24 and 26 alone and declined to interpret the terms "silicates" and "metallic silicates" therein as being limited or qualified by specifications to mean only the nine metallic silicates which had been proved operative. The District Court considered that the claims therefore were too broad and comprehended more than the invention. The Court of Appeals considered that because there was nothing in the record to show that the applicants for the patent intended by these claims to assert a monopoly broader than nine metallic silicates named in the specifications, the court should have construed the claims as thus narrowed and limited by the specifications.

The statute makes provision for specification separately from the claims and requires that the latter "shall particularly point out and distinctly claim the part, improvement or combination which he claims as his invention or discovery." R. S. § 4888, as amended, 35 U. S. C. § 33.

It would accomplish little to require that claims be separately written if they are not to be separately read. While vain repetition is no more to be encouraged in patents than in other documents, and claims like other statements may incorporate other matter by reference, their text must be sufficient to "particularly point out and distinctly claim" an identifiable invention or discovery. We have frequently held that it is the claim which measures the grant to the patentee. See for example, *Milcor Steel Co.* v. *Fuller Co.*, 316 U. S. 143, 145; *General Electric Co.* v. *Wabash Co.*, 304 U. S. 364, 369; *Altoona Theatres* v. *Tri-Ergon Corp.*, 294 U. S. 477, 487. While the cases more often have dealt with efforts to resort to specifications to expand claims, it is clear that the later fail equally to perform their function as a measure of the grant when they overclaim the invention. When they do so to the point of invalidity and are free from ambiguity which might justify resort to the specifications, we agree with the District Court that they are not to be saved because the latter are less inclusive. *Cf. General Electric Co.* v. *Wabash Co.*, 304 U. S. 364, 373-374; see *McClain* v. *Ortmayer*, 141 U. S. 419, 424-425; *Cimiotti Unhairing Co.* v. *American Fur Refining Co.*, 198 U. S. 399, 410.

We think the District Court correctly applied this principle to claims 24 and 26.

III. Process Claims.

All process claims were held invalid by the District Court; those numbered 1, 3, 4, 7, 8 and 9, because they make no specific reference to the essential chemical constituents of the welding composition to be used in the claimed welding process, a conclusion with which we agree. Process claim 2 was held invalid for the reason applicable to flux claims 24 and 26, with which we also agree. Others, namely 5, 6, 11, 12, 13, 14, 15, 16 and 17, and composition claim 27 were held invalid because they

erroneously imported that the sole conductive medium through which electric current passes from the electrode to the base metal is the welding composition which is in a molten state, and that no electric arc phenomenon is present.

The court found that the procedural steps in the process taught by the patent are identical in all respects with those followed in prior automatic electric welding processes and that the only invention or discovery resides in the use of a different welding composition. It sustained the patent for the composition, as we have shown, but denied its validity insofar as it claimed the old procedure.

The trial court gave extensive consideration to the process claims. It agreed that a radically new process would have been discovered if it could be said that the electric current passed between the electrode and the base metal through a welding composition in a liquid state and that no electric arc is present. All of the previous art had used the electric arc. But with full appreciation of the critical nature of the inquiry and after long litigation of the technology of the art, the court concluded that no such finding of departure from the prior art could be made and said that the evidence is persuasive that no such basic difference in phenomena is present in the Jones method.

The District Court reinforced its conclusion by pointing out that the inventors themselves initially did not conceive their invention to embody any such radical departure from known phenomena and that their first application for a patent was replete with references to the presence and use of an electric arc in the new method. It was only after they had assigned their rights to the respondent that the suggestion of a basically new phenomenon, other than an arc, was made. Just what happens in the Jones method admits of controversy, for there is no visual evidence of an electric arc after the welding operation commences because what actually occurs between the electrode and the metal base is hidden from view by

the flux. The court concluded that it is impossible to say with complete certainty that there is not an arc and one of the plaintiff's expert witnesses gave substantial support to the idea that the arc is still present, although it is shielded by the flux in the Jones patent.

The same deference is due to the findings of the trial court which overturn claims as to those which sustain them. Technicians may and probably will continue to debate with plausible arguments on each side as to what this obscure process really is. But the record in this case, while not establishing to a certainty that the findings are right, fall far short of convincing us that they are clearly erroneous. We think that the rules that govern review entitle the trial court's conclusions to prevail and that the process claims are invalid under the statute.

IV. Abuse of Patent.

Contentions are made that the patent has been abused through efforts to broaden the patent monopoly by requiring the purchase of unpatentable material for use in connection with it. The trial court found, however, that the plaintiff does not impose on licensees, either as a condition of a license or otherwise, any requirement, condition, agreement or understanding as to the purchase or use of unpatentable commodities and that its licensees are free to buy and use any materials and equipment from any source. The court recognized that an appearance of such freedom is not conclusive if it conceals a subterfuge and that there is a real, although informal, restraint. But examining the conduct of the plaintiff, it found no such obstacle to the maintenance of an action for infringement on that part of the patent which was valid. The Court of Appeals affirmed, and we accept the conclusion of the two courts below on this branch of the case.

Our conclusion is that the judgment of the Court of Appeals, insofar as it reverses that of the District Court,

should be reversed and that the judgment of the District Court be in all things reinstated. To that extent the judgment below is reversed.

It is so ordered.

MR. JUSTICE BLACK, with whom MR. JUSTICE DOUGLAS joins, concurring.

I concur in the Court's judgment in this case and in parts II, III and IV of the Court's opinion. But my concurrence in the holding that Claims 18, 20, 22 and 23 are valid does not rest merely on findings of the District Court and the Court of Appeals that those claims were valid. While accepting the findings of those two courts on what I consider to be questions of fact, it is my view that determination of the ultimate question of patentability cannot properly be classified as a finding of fact. I would adhere to this Court's earlier pronouncement that "whether the thing patented amounts to a patentable invention" is a question of law to be decided by the courts as such. *Mahn* v. *Harwood,* 112 U. S. 354, 358; and see dissenting opinions in *Goodyear Tire & Rubber Co.* v. *Ray-O-Vac Co.,* 321 U. S. 275, 280, note 1, and *Williams Manufacturing Co.* v. *United Shoe Machinery Corp.,* 316 U. S. 364, 383.

I agree, however, that the facts found here justify the holding that Claims 18, 20, 22, and 23 do show patentable discovery when measured by the standards announced by this Court in *Cuno Engineering Corp.* v. *Automatic Devices Corp.,* 314 U. S. 84. For this reason I concur in affirming the judgment to the extent that it held these claims valid.

SUPREME COURT OF THE UNITED STATES

No. 2.—October Term, 1949.

Graver Tank & Mfg. Co., Inc., The Lincoln Electric Company, and Graver Tank & Mfg. Corporation, Petitioners,

v.

The Linde Air Products Company.

On Writ of Certiorari to the United States Court of Appeals for the Seventh Circuit.

[Decided May 29, 1950; reported 339 U. S. 605.]

Mr. Justice Jackson delivered the opinion of the Court.

Linde Air Products Co., owner of the Jones patent for an electric welding process and for fluxes to be used therewith brought an action for infringement against Lincoln and the two Graver companies. The trial court held four flux claims valid and infringed and certain other flux claims and all process claims invalid. 75 U. S. P. Q. 231. The Court of Appeals affirmed findings of validity and infringement as to the four flux claims but reversed the trial court and held valid the process claims and the remaining contested flux claims. 167 F. 2d 531. We granted certiorari, 335 U. S. 810, and reversed the judgment of the Court of Appeals insofar as it reversed that of the trial court, and reinstated the District Court decree. 336 U. S. 271. Rehearing was granted, limited to the question of infringement of the four valid flux claims and to the applicability of the doctrine of equivalents to findings of fact in this case. 337 U. S. 910.

At the outset it should be noted that the single issue before us is whether the trial court's holding that the four flux claims have been infringed will be sustained. Any

issue as to the validity of these claims was unanimously determined by the previous decision in this Court and attack on their validity cannot be renewed now by reason of limitation on grant of rehearing. The disclosure, the claims, and the prior art have been adequately described in our former opinion and in the opinions of the courts below.

In determining whether an accused device or composition infringes a valid patent, resort must be had in the first instance to the words of the claim. If accused matter falls clearly within the claim, infringement is made out and that is the end of it.

But courts have also recognized that to permit imitation of a patented invention which does not copy every literal detail would be to convert the protection of the patent grant into a hollow and useless thing. Such a limitation would leave room for—indeed encourage—the unscrupulous copyist to make unimportant and insubstantial changes and substitutions in the patent which, though adding nothing, would be enough to take the copied matter outside the claim, and hence outside the reach of law. One who seeks to pirate an invention, like one who seeks to pirate a copyrighted book or play, may be expected to introduce minor variations to conceal and shelter the piracy. Outright and forthright duplication is a dull and very rare type of infringement. To prohibit no other would place the inventor at the mercy of verbalism and would be subordinating substance to form. It would deprive him of the benefit of his invention and would foster concealment rather than disclosure of inventions, which is one of the primary purposes of the patent system.

The doctrine of equivalents evolved in response to this experience. The essence of the doctrine is that one may not practice a fraud on a patent. Originating almost a century ago in the case of *Winans* v. *Denmead*, 15 How. 330, it has been consistently applied by this Court and the lower federal courts, and continues today ready and available for utilization when the proper circumstances for its application arise. "To temper unsparing logic and prevent an infringer from stealing the benefit of an inven-

tion"[1] a patentee may invoke this doctrine to proceed against the producer of a device "if it performs substantially the same function in substantially the same way to obtain the same result." *Sanitary Refrigerator Co.* v. *Winters,* 280 U. S. 30, 42. The theory on which it is founded is that "if two devices do the same work in substantially the same way, and accomplish substantially the same result, they are the same, even though they differ in name, form, or shape." *Machine Co.* v. *Murphy,* 97 U. S. 120, 125. The doctrine operates not only in favor of the patentee of a pioneer or primary invention, but also for the patentee of a secondary invention consisting of a combination of old ingredients which produce new and useful results, *Imhaeuser* v. *Buerk,* 101 U. S. 647, 655, although the area of equivalence may vary under the circumstances. See *Continental Paper Bag Co.* v. *Eastern Paper Bag Co.,* 210 U. S. 405, 414-415, and cases cited; *Seymour* v. *Osborne,* 11 Wall. 516, 556; *Gould* v. *Rees,* 15 Wall. 187, 192. The wholesome realism of this doctrine is not always applied in favor of a patentee but is sometimes used against him. Thus, where a device is so far changed in principle from a patented article that it performs the same or a similar function in a substantially different way, but nevertheless falls within the literal words of the claim, the doctrine of equivalents may be used to restrict the claim and defeat the patentee's action for infringement. *Westinghouse* v. *Boyden Power Brake Co.,* 170 U. S. 537, 568. In its early development, the doctrine was usually applied in cases involving devices where there was equivalence in mechanical components. Subsequently, however, the same principles were also applied to compositions, where there was equivalence between chemical ingredients. Today the doctrine is applied to mechanical or chemical equivalents in compositions or devices. See discussions and cases collected in 3 Walker on Patents (Deller's ed. 1937) §§489-492; Ellis, Patent Claims (1949) §§59-60.

What constitutes equivalency must be determined against the context of the patent, the prior art, and the

[1] L. Hand in *Royal Typewriter Co.* v. *Remington Rand,* 168 F. 2d 691, 692.

particular circumstances of the case. Equivalence, in the patent law, is not the prisoner of a formula and is not an absolute to be considered in a vacuum. It does not require complete identity for every purpose and in every respect. In determining equivalents, things equal to the same thing may not be equal to each other and, by the same token, things for most purposes different may sometimes be equivalents. Consideration must be given to the purpose for which an ingredient is used in a patent, the qualities it has when combined with the other ingredients, and the function which it is intended to perform. An important factor is whether persons reasonably skilled in the art would have known of the interchangeability of an ingredient not contained in the patent with one that was.

A finding of equivalence is a determination of fact. Proof can be made in any form: through testimony of experts or others versed in the technology; by documents, including texts and treatises; and, of course, by the disclosures of the prior art. Like any other issue of fact, final determination requires a balancing of credibility, persuasiveness and weight of evidence. It is to be decided by the trial court and that court's decision, under general principles of appellate review, should not be disturbed unless clearly erroneous. Particularly is this so in a field where so much depends upon familiarity with specific scientific problems and principles not usually contained in the general storehouse of knowledge and experience.

In the case before us, we have two electric welding compositions or fluxes: the patented composition, Unionmelt Grade 20, and the accused composition, Lincolnweld 660. The patent under which Unionmelt is made claims essentially a combination of alkaline earth metal silicate and calcium fluoride; Unionmelt actually contains, however, silicates of calcium and magnesium, two alkaline earth metal silicates. Lincolnweld's composition is similar to Unionmelt's, except that it substitutes silicates of calcium and manganese—the latter not an alkaline earth metal—for silicates of calcium and magnesium. In all other respects, the two compositions are alike. The mechanical

methods in which these compositions are employed are similar. They are identical in operation and produce the same kind and quality of weld.

The question which thus emerges is whether the substitution of the manganese which is not an alkaline earth metal for the magnesium which is, under the circumstances of this case, and in view of the technology and the prior art, is a change of such substance as to make the doctrine of equivalents inapplicable; or conversely, whether under the circumstances the change was so insubstantial that the trial court's invocation of the doctrine of equivalents was justified.

Without attempting to be all-inclusive, we note the following evidence in the record: Chemists familiar with the two fluxes testified that manganese and magnesium were similar in many of their reactions (R. 287, 669). There is testimony by a metallurgist that alkaline earth metals are often found in manganese ores in their natural state and that they serve the same purpose in the fluxes (R. 831-832); and a chemist testified that "in the sense of the patent" manganese could be included as an alkaline earth metal (R. 297). Much of this testimony was corroborated by reference to recognized texts on inorganic chemistry (R. 332). Particularly important, in addition, were the disclosures of the prior art, also contained in the record. The Miller patent, No. 1,754,566, which preceded the patent in suit, taught the use of manganese silicate in welding fluxes (R. 969, 971). Manganese was similarly disclosed in the Armor patent, No. 1,467,825, which also described a welding composition (R. 1346). And the record contains no evidence of any kind to show that Lincolnweld was developed as the result of independent research or experiments.

It is not for this Court to even essay an independent evaluation of this evidence. This is the function of the trial court. And, as we have heretofore observed, "To no type of case is this . . . more appropriately applicable than to the one before us, where the evidence is largely the testimony of experts as to which a trial court may be enlightened by scientific demonstrations. The trial occupied some three

weeks, during which, as the record shows, the trial judge visited laboratories with counsel and experts to observe actual demonstration of welding as taught by the patent and of the welding accused of infringing it, and of various stages of the prior art. He viewed motion pictures of various welding operations and tests and heard many experts and other witnesses." 336 U. S. 271, 274-275.

The trial judge found on the evidence before him that the Lincolnweld flux and the composition of the patent in suit are substantially identical in operation and in result. He found also that Lincolnweld is in all respects equivalent to Unionmelt for welding purposes. And he concluded that "for all practical purposes, mangnaese silicate can be efficiently and effectively substituted for calcium and magnesium silicates as the major constituent of the welding composition." These conclusions are adequately supported by the record; certainly they are not clearly erroneous.[2]

It is difficult to conceive of a case more appropriate for application of the doctrine of equivalents. The disclosures of the prior art made clear that manganese silicate was a useful ingredient in welding compositions. Specialists familiar with the problems of welding compositions understood that manganese was equivalent to and could be substituted for magnesium in the composition of the patented flux and their observations were confirmed by the literature of chemistry. Without some explanation or indication that Lincolnweld was developed by independent research, the trial court could properly infer that the accused flux is the result of imitation rather than experimentation or invention. Though infringement was not literal, the changes which avoid literal infringement are colorable only. We conclude that the trial court's judgment of infringement respecting the four flux claims was proper, and we adhere to our prior decision on this aspect of the case.

Affirmed.

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[2] Rule 52 (a), Federal Rules of Civil Procedure, provides in part: "Findings of fact shall not be set aside unless clearly erroneous, and due regard shall be given to the opportunity of the trial court to judge of the credibility of the witnesses."

MR. JUSTICE BLACK, with whom MR. JUSTICE DOUGLAS concurs, dissenting.

I heartily agree with the Court that "fraud" is bad, "piracy" is evil, and "stealing" is reprehensible. But in this case, where petitioner is not charged with any such malevolence, these lofty principles do not justify the Court's sterilization of Acts of Congress and prior decisions, none of which are even mentioned in today's opinion.

The only patent claims involved here describe respondent's product as a flux "containing a major proportion of alkaline earth metal silicate." The trial court found that petitioner used a flux "composed principally of manganese silicate." Finding also that "manganese is not an alkaline earth metal," the trial court admitted that petitioner's flux did not "literally infringe" respondent's patent. Nevertheless it invoked the judicial "doctrine of equivalents" to broaden the claim for "alkaline earth metals" so as to embrace "manganese." On the ground that "the fact that manganese is a proper substitute . . . is fully disclosed in the specification" of respondent's patent, it concluded that "no determination need be made whether it is a known chemical fact *outside* the teachings of the patent that manganese is an equivalent. . . ." Since today's affirmance unquestionably follows the findings of the trial court, this Court necessarily relies on what the specifications revealed.[1] In so doing, it violates a direct mandate of Congress without even discussing that mandate.

R. S. § 4888, as amended, 35 U. S. C. § 33, provides that an applicant "shall particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery." We have held in this very case that this statute precludes invoking the specifications to alter a claim free from ambiguous language, since "it is the claim which measures the grant to the

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[1] For this reason the tidbits of evidence painstakingly selected from the record by this Court have no significance, since the trial court avowedly did not look beyond the specifications themselves.

patentee."[2] *Graver Mfg. Co.* v. *Linde Co.*, 336 U. S. 271, 277. What is not specifically claimed is dedicated to the public. See, *e. g.*, *Miller* v. *Brass Co.*, 104 U. S. 350, 352. For the functions of claims under R. S. § 4888, as we have frequently reiterated, is to exclude from the patent monopoly field all that is not specifically claimed, whatever may appear in the specifications. See *e. g.*, *Marconi Wireless Co.* v. *United States*, 320 U. S. 1, 23, and cases there cited. Today the Court tacitly rejects those cases. It departs from the underlying principle which, as the Court pointed out in *White* v. *Dunbar*, 119 U. S. 47, 51, forbids treating a patent claim "like a nose of wax which may be turned and twisted in any direction, by merely referring to the specifications, so as to make it include something more than, or something different from, what its words express. . . . The claim is a statutory requirement, prescribed for the very purpose of making the patentee define precisely what his invention is; and it is unjust to the public, as well as an evasion of the law, to construe it in a manner different from the plain import of its terms." Giving this patentee the benefit of a grant that it did not precisely claim is no less "unjust to the public" and no less an evasion of R. S. § 4888 merely because done in the name of the "doctrine of equivalents."

In seeking to justify its emasculation of R. S. § 4888 by parading potential hardships which literal enforcement might conceivably impose on patentees who had for some reason failed to claim complete protection for their discoveries, the Court fails even to mention the program for alleviation of such hardships which Congress itself has provided. 35 U. S. C. § 64 authorizes reissue of patents where a patent is "wholly or partly inoperative" due to certain errors arising from "inadvertence, accident or mistake" of the patentee. And while the section does not expressly permit a patentee to expand his claim, this Court has reluctantly interpreted it to justify doing so. *Miller*

[2] This Court's approval of the trial judge's resort to specifications is ironic as well as unfortunate. In its original opinion this Court rejected respondent's contention that the very language invoked here to support infringement should be applied to validate a claim otherwise too broad to be upheld. 336 U. S. 271, 277.

v. *Brass Co.*, 104 U. S. 350, 353-354. That interpretation, however, was accompanied by a warning that "Reissues for the enlargement of claims should be the exception and not the rule." *Id.* at 355. And Congress was careful to hedge the privilege of reissue by exacting conditions. It also entrusted the Patent Office, not the courts, with initial authority to determine whether expansion of a claim was justified,[3] and barred suits for retroactive infringement based on such expansion. Like the Court's opinion, this congressional plan adequately protects patentees from "fraud," "piracy," and "stealing." Unlike the Court's opinion, it also protects businessmen from retroactive infringement suits and judicial expansion of a monopoly sphere beyond that which a patent expressly authorizes. The plan is just, fair, and reasonable. In effect it is nullified by today's opinion undercutting what this Court has recognized as wise safeguards. See *Milcor Steel Co.* v. *Fuller Co.*, 316 U. S. 143, 148. One need not be a prophet to suggest that this rhapsody on the virtue of the "doctrine of equivalents" will, in direct contravention of the *Miller* case, *supra*, make enlargement of patent claims the "rule" rather than the "exception."

Whatever the merits of the "doctrine of equivalents" where differences between the claims of a patent and the allegedly infringing product are *de minimis*, colorable only, and without substance, that doctrine should have no applica-

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[3] "This provision was inserted in the law for the purpose of relieving the courts from the duty of ascertaining the exact invention of the patentee by inference and conjecture, derived from a laborious examination of previous inventions, and a comparison thereof with that claimed by him. This duty is now cast upon the Patent Office. There his claim is, or is supposed to be, examined, scrutinized, limited, and made to conform to what he is entitled to. If the office refuses to allow him all that he asks, he has an appeal. But the courts have no right to enlarge a patent beyond the scope of its claim as allowed by the Patent Office, or the appellate tribunal to which contested applications are referred. When the terms of a claim in a patent are clear and distinct (as they always should be), the patentee, in a suit brought upon the patent, is bound by it. *Merrill* v. *Yeomans*, 94 U. S. 568." *Keystone Bridge Co.* v. *Phoenix Iron Co.*, 95 U. S. 274, 278.

tion to the facts of this case. For the differences between respondent's welding substance and petitioner's claimed flux were not nearly so slight. The claims relied upon here did not involve any mechanical structure or process where invention lay in the construction or method rather than in the materials used. Rather they were based wholly on using particular materials for a particular purpose. Respondent's assignors experimented with several metallic silicates, including that of manganese. According to the specifications (if these are to be considered) they concluded that while several were "more or less efficacious in our process, we prefer to use silicates of the alkaline earth metals." Several of their claims which this Court found too broad to be valid encompassed manganese silicate; the only claims found valid did not. Yet today the Court disregards that crucial deficiency, holding those claims infringed by a composition of which 88.49% by weight is manganese silicate.

In view of the intense study and experimentation of respondent's assignors with manganese silicate, it would be frivolous to contend that failure specically to include that substance in a precise claim was unintentional. Nor do respendents attempt to give that or any other explanation for its omission. But the similar use of manganese in prior expired patents, referred to in the Court's opinion, raises far more than a suspicion that its elimination from the valid claims stemmed from fear that its inclusion by name might result in denial or subsequent invalidation of respondent's patent.

Under these circumstances I think petitioner had a right to act on the belief that this Court would follow the plain mandates of Congress that a patent's precise claims mark its monopoly boundaries, and that expansion of those claims to include manganese could be obtained only in a statutory reissue proceeding. The Court's ruling today sets the stage for more patent "fraud" and "piracy" against business than could be expected from faithful observance of the congressionally enacted plan to protect business against judicial expansion of precise patent claims.

Hereafter a manufacturer cannot rely on what the language of a patent claims. He must be able, at the peril of heavy infringement damages, to forecast how far a court relatively unversed in a particular technological field will expand the claim's language after considering the testimony of technical experts in that field. To burden business enterprise on the assumption that men possess such a prescience bodes ill for the kind of competitive economy that is our professed goal.

The way specific problems are approached naturally has much to do with the decisions reached. A host of prior cases, to some of which I have referred, have treated the 17-year monopoly authorized by valid patents as a narrow exception to our competitive enterprise system. For that reason, they have emphasized the importance of leaving business men free to utilize all knowledge not preempted by the precise language of a patent claim. *E. g., Sontag Stores Co.* v. *Nut Co.*, 310 U. S. 281, and cases there cited. In the *Sontag* case Mr. Justice McReynolds, speaking for a unanimous Court, said in part: "In the case under consideration the patentee might have included in the application for the original patent, claims broad enough to embrace petitioner's accused machine, but did not. This 'gave the public to understand' that whatever was not claimed 'did not come within his patent and might rightfully be made by anyone.' " *Id.* at 293.

The Court's contrary approach today causes it to retreat from this sound principle. The damages retroactively assessed against petitioner for what was authorized until today are but the initial installment on the cost of that retreat.

MR. JUSTICE DOUGLAS, dissenting.

The Court applies the doctrine of equivalents in a way which subverts the constitutional and statutory scheme for the grant and use of patents.

The claims of the patent are limited to a flux "containing a major proportion of alkaline earth metal silicate." Manganese silicate, the flux which is held to infringe, is not an alkaline earth metal silicate. It was disclosed in

the application and then excluded from the claims. It therefore became public property. See *Mahn* v. *Harwood,* 112 U. S. 354, 361. It was, to be sure, mentioned in the specifications. But the measure of the grant is to be found in the claims, not in the specifications. *Milcor Steel Co.* v. *Fuller Co.,* 316 U. S. 143, 145, 146. The specifications can be used to limit but never to expand the claim. See *McClain* v. *Ortmayer,* 141 U. S. 419, 424.

The Court now allows the doctrine of equivalents to erase those time-honored rules. Moreover, a doctrine which is said to protect against practicing "a fraud on a patent" is used to extend a patent to a composition which could not be patented. For manganese silicate had been covered by prior patents, now expired. Thus we end with a strange anomaly: a monopoly is obtained on an unpatented and unpatentable article.

THE UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF INDIANA,

HAMMOND DIVISION.

UNION CARBIDE & CARBON CORPORATION,
Plaintiff,

vs.

GRAVER TANK & MFG. CO., INC., THE LINCOLN ELECTRIC COMPANY, GRAVER TANK & MFG. CORP., JAMES FINNEY LINCOLN, President of Lincoln Electric Company,
Defendants.

No. 607 Civil.

[Decided November 29, 1951.]

MEMORANDUM OPINION.

The foregoing action has been pending in this court for some time under the caption of the Linde Air Products Company, plaintiff, against Graver Tank & Mfg. Company, *et al.* There has been tried and determined the question of validity as to what is known in the record as the Jones *et al.* Patent No. 2,043,960. The trial judge determined and found that the patent was valid and had been infringed by the defendants, other than the individual defendant, and made and on July 10, 1950, filed his injunction wherein it was adjudged and decreed, that the defendants, their officers and agents be and they are enjoined and restrained from making, using, advertising or selling welding compositions and fluxes covered by claims number 18, 20, 22 and 23 of the Jones *et al.* patent.

The plaintiff above named has now filed a motion to adjudge the defendants named above in contempt of court

for having violated said injunction. Said motion was filed in this court on the 1st day of December, 1950, and is supported by an affidavit signed by R. E. Cornwell, avering that defendants have ever since the entering of the injunction, of which they had due knowledge and notice, manufactured and sold commercially what is known in the record as the Lincolnweld 700 Series and designated as Lincolnweld 770, 780 and 760, and by an amendment that includes the Lincolnweld 840 flux, which it alleged also to have been commercially manufactured and sold by the defendants. Mr. Cornwell in his affidavit in substance avers that the defendant Lincoln Electric Company has deliberately copied the fluxes defined in the Jones *et al.* patent. To this motion, supported by the affidavit of Mr. Cornwell, the defendants have filed an answer denying the allegations set out in the affidavit and motion, and state that they have not in any way whatever been in contempt of said injunction, but have faithfully, fully and punctiliously obeyed and abided by its terms. This answer goes into detail as to the reasons why the defendants have not violated the court's injunction and it asks that plaintiff's motion be dismissed with costs and attorney fees charged against the plaintiff. This answer was filed on February 10, 1951, and by permission of court an amendment to said answer was filed on October 26, 1951.

The motion of the plaintiff that the defendants are in contempt of court for directly or contributorily violating the injunction is limited to the question as to whether or not the injunction has been violated by the manufacture and sale of these Lincolnweld fluxes or by contributing thereto.

The patent in suit has to do with the advancements of electric welding. The first sentence of the patent reciting, "This invention relates to electric welding."

The trial of the orginal case was reviewed by the Court of Appeals of this Circuit and by the Supreme Court of the United States. It was definitely determined, and this Court now finds, that not only had the patentees invented something patentable over the prior art in electric welding, but that such invention was an important improvement in

electric welding and an outstanding contribution to, and an important improvement in the art of electric welding. The Jones *et al.* invention is so broad and teaches so many new and additional features regarding electric welding that it seems to me the patent itself transcends in importance the compositions which are set out in the claims of the patent, and that the claims are in truth subordinate to the invention shown by the patent. However, the defendants claim that their compositions are substantially different from the claims which were held valid in the former proceedings, and consequently the patent is not infringed.

The advancement in the art is carefully set out by Judge Swygert in his original opinion reported in 86 Fed. Supp. 191, so that it will be unnecessary for me again to set it out here. The law governing the case especially on the question of equivalents is set out by Justice Jackson in his discussion of this case in 336 U. S. 271 and 339 U. S. 605.

The defendant Lincoln Electric Company has complimented the plaintiff by copying the teachings of the patent. The plaintiff in its final argument has succinctly set out the similarity in the results obtained and the method of their welding and from the evidence and the demonstrations shown by it during the trial established that the appearance of the fluxes of the defendants, to-wit: the Lincolnweld 770, 780, 760 and 840 are practically the same as the compositions made up from plaintiff's patent. They are all granular, free-flowing materials. They can all be fed in the same way from a hopper into the seam to be welded. They all have practically the same sizes and the same feel to the touch and are similar in color. They are all "finely divided, unbonded" compositions. The use of the so-called binder of sodium silicate may make the particles adhere, but not sufficiently to destroy the description of the particles as being unbonded within the meaning of that term as used in the claims of the patent. They are not bonded in the sense that they cannot be used as an unbonded composition.

The physical set up is practically the same.

The operating conditions are practically the same. When a plate of some selected thickness is being welded the same

values can be and are used for the Lincolnweld series as for a weld made from the claims of the patent in suit. And this in respect to the travel, speed and the voltage or current.

The appearance during the welding action is the same.

The finished weld is the same.

During the weld both compositions are practically free from gas and moisture. It may be said, in general, that each of the 700 series of defendants' fluxes operate substantially in the same manner and provide substantially the same results as a composition made in accordance with the claims of the patent.

To paraphrase a statement made by Judge Jackson, the mechanical method of these compositions are similar and they are identical in operation and produce the same kind of weld.

There may be some superiority in defendants' fluxes, which results in additional tensile strength to their weld or which permits their weld to be unaffected by mill scale or oil. But if there is, it would probably be caused by ingredients added which would not affect plaintiff's disclosure. Addition of other ingredients to those claims, does not void infringement if the essential character of the compound remains the same, as it does in this case.

The defendants claim that their fluxes do not infringe on the plaintiff's claims; that the heart of plaintiff's invention is the claims and they rely upon the rule set forth by Judge Jackson that, "It is the claim which measures the grant to the patentee."

There is no doubt of the law that a patent cannot be extended or enlarged by the specifications, but they can explain the claims and the claims should be read in the light of the specifications. The Circuit Court of Appeals appears to consider all the statements in plaintiff's application as being specifications.

> "The claims of a patent are not insular, but are integral parts of the patent, and the language of the claims must be construed in the light of, and as parts of, one entire instrument. • • •

"The claims of a patent are not to be construed with legalistic rigidity. They are addressed to those skilled in the art, and are entitled to a fair and reasonable interpretation, such as will vitalize the grant, and to a reasonable flexibility of interpretation. The claims are to be read or interpreted in the light of the entire disclosure of the patent, not literally *in vacuo,* the verbiage of the patent should be considered in ascertaining the scope and purview of the claim. * * *"

Patents, Corpus Juris Secundum Vol. 69, §204, page 675.

Defendants also claim that their fluxes consist almost wholly of unreacted oxides plus silica or quartz; that they are composed of an acid component, namely quartz; and a basic component, Manganese oxide. And that the plaintiff had sought to patent by claims in the patent office a composition broad enough to cover these components. It later abandoned these claims and the defendants maintain that this creates an estoppel.

It is unnecessary to discuss these questions as I am satisfied the defendants' fluxes are composed of substantially the same ingredients as those set out in the claims of the plaintiff's patent.

The materials have been completely reacted by the kiln treatment.

It must be conceded that the defendant Lincoln Electric Company has since 1945 been improving their welds from time to time; and have endeavored to escape a charge of violation of this court's injunction. They have not been so foolish as to intentionally use the materials defined in the claims of the patent in suit, but by trial and error, they have arrived at the same result, and either intentionally or unintentionally, have done so by the use of the kiln which changed the starting materials to silicates.

There is a possibility, of course, that the defendants in the improvement of their weld have used elements which would result exactly the same as do the materials used in keeping with the claims of the patent. It is more probable

as testified to by the plaintiff's experts that the application and treatment of heat to the starting materials caused such materials to be reacted and form silicates.

Or to put it another way: the heating and treatment of the starting materials as practiced by he Lincoln Electric Company results in producing, either intentionally or unintentionally, what otherwise may have been substantial changes in the materials used to elements that are or that have the same chemical values; and produce the same or substantially the same result in the same way and manner as do the materials described or referred to in the claims of plaintiff's patent.

The main contention of the defendants is that their fluxes do not contain a major proportion of alkaline earth metal silicate. It would be a little difficult from the testimony of the experts to come to a positive decision as to whether defendants' composition did contain a major proportion of silicate as the experts are somewhat divided on the question. All of the experts for the plaintiff and at least some of the experts for the defendants admit that there are some silicates of a kind referred to in the claims of the patent appearing in defendants' product in some appreciable degree, but differ as to the amount. There is sufficient silicate in the defendants' fluxes to accomplish the desired results, and I am abidingly satisfied that the fluxes of the defendants, to-wit: Lincolnweld 770, 780, 760 and 840 are substantially the same with respect to silicates as required by the patent; that such fluxes infringe because the elements in the compositions are first, substantially the same thing as required by the Jones *et al.* patent; and second, operate substantially the same way; and third, they substantially accomplish the same results.

I cannot see or go along with the defendants in their claim that the chemical reactions between the components of the welding composition are not completed before it is sold as a weld. While not conclusive in its importance, it seems to me clear that either by heating the base materials or by heating them in the kiln the basic constituents are reacted.

I have examined carefully the other defenses plead and argued in the case and find them either not established by a preponderance of the evidence or unconvincing.

Defendant Lincoln Electric Company has infringed the plaintiff's patent, by the manufacture and sale of Lincolnweld 770 since July, 1948; Lincolnweld 780 since March, 1949; Lincolnweld 760 since June, 1950; and Lincolnweld 840 since the early part of 1951, and that they infringe upon Jones *et al.* patent and since July 10, 1950, are in violation of the Court's injunction hereinbefore referred to.

The other defendants, other than Mr. Lincoln, have contributed to the infringement.

I also find that this violation of the injunction was done with the full knowledge of the contents of the injunction and was either intentionally done or with disregard of the rights of the owner of the patent.

The defendants in relying upon the opinion of their counsel, it seems to me, should have known that the patent was much broader than the claims standing alone might indicate. Also that common sense should have told them that they were getting too close to the patent and should have discovered that their fluxes were substantially the same in their use and results, as those owned by the plaintiff.

The question of the financial responsibility of the defendants in this case is difficult to determine for if there is any evidence in the record as to the financial status of the defendant companies, it has not been pointed out to me. However, the defendants' counsel in argument did state that the Lincoln Company had developed into a large one and now had one thousand employees. It seems to me there is sufficient evidence that the business is substantial, and I find that there should be a judgment for the plaintiff against the defendants Lincoln Electric Company and the Graver Tank & Mfg. Co., Inc. and the Graver Tank and Mfg. Corp. in an aggregate sum of $25,000.00, which will be divided as $15,000.00 against the Lincoln Electric Company and $5,000.00 each as against the other two companies.

Plaintiff is also entitled to an attorney fee. Such attorney fee is allowable only to one attorney and a judgment

will therefore be authorized in favor of the principal attorney for the plaintiff, John T. Cahill, in an amount of $5,000.00, which he can distribute among his associate counsel as he may deem fit. The penalty should also include the costs of the case to be taxed as a judgment against the defendants other than James Finney Lincoln as I do not find sufficient evidence as to warrant holding him. If he is guilty at all, it is as an officer and employee of the Lincoln Electric Company and there is nothing in the evidence to distinguish any act or conduct on his part with reference to the fluxes as an individual. I therefore find in his favor in his case, which will be dismissed as to him.

The attorneys for the plaintiff may prepare findings of fact, and conclusions of law not inconsistent with this opinion, together with a form of decree to be entered. They will send a copy thereof to each of the defendants, or an attorney of record for the defendants, at least three days before the presenting of the findings of fact, conclusions of law and decree, which shall be presented to the trial judge in open court in Hammond, Indiana, on December 10, 1951, at 10:00 A. M.

The defendants' motion to dismiss is overruled.

To each and all of the statements made herein the defendants except.

CHARLES A. DEWEY,
United States District Judge.

Hammond, Indiana
November 26, 1951.

THE UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF INDIANA,

HAMMOND DIVISION.

UNION CARBIDE & CARBON CORPORATION, Plaintiff, *vs.* GRAVER TANK & MFG. CO., INC., THE LINCOLN ELECTRIC COMPANY, and GRAVER TANK & MFG. CORP., Defendants.	Civil Action No. 607.

[December 10, 1951.]

This cause having been brought on for further hearing beginning November 5, 1951, and having been fully heard on the pleadings and proceedings heretofore had herein and on further proofs and arguments, each party having examined experts and other witnesses in the presence of the Court and the Court having judged their credibility and competence, and the Court having visited laboratories with counsel and experts to observe actual demonstrations of welding with defendants' fluxes and other compositions taught by the patent and welding with other materials, and the cause having been duly considered;

The Court hereby makes the following findings of fact and conclusions of law:

FINDINGS OF FACT.

1. The defendant Lincoln Electric Company, in making its Lincolnweld 760, 770, 780 and 840 fluxes, in general copied the teachings of the Jones, *et al.* Patent No. 2,043,960.

2. The Lincolnweld 760, 770, 780 and 840 fluxes are all granular, free-flowing, finely divided materials. They can all be fed from a hopper into a seam to be welded in the same manner as other compositions made up from the Jones, *et al.* Patent No. 2,043,960. They all have practically the same particle size, same feel to the touch, and similarity of color as other compositions made up from the patent.

3. The Lincolnweld 760, 770, 780 and 840 fluxes are all "unbonded" compositions within the meaning of that term as used in claims 22 and 23 of the Jones *et al.* patent.

4. The same physical set-up of equipment is used in welding with the Lincolnweld 760, 770, 780 and 840 fluxes as is described in the patent. The same procedures are employed. The operating conditions are practically the same. For example, in welding a plate of selected thickness, the same values of voltage, current and travel speed are employed.

5. The same welding action occurs when using the Lincolnweld 760, 770, 780 and 840 fluxes as is described in the patent and in the opinion of this Court dated June 6, 1947. The same melting of the plate and rod under a quiescent layer of granular flux occurs, with freedom from open-arc glare, fumes, smoke and splatter.

6. The finished welds made with the Lincolnweld 760, 770, 780 and 840 fluxes are the same as those produced with what the patent describes as the preferred composition. The finished welds are of the same size, shape, appearance and structure. If there is any additional tensile strength of welds made with defendants' fluxes, or ability of those fluxes to tolerate mill scale or oil, it is due to the addition to such fluxes of additional elements. Such additives do not change the essential character of the composition defined in the claims.

7. The Lincolnweld 760, 770, 780 and 840 fluxes are made at the Lincoln Electric Company in gas-fired furnaces

or kilns, the temperatures employed being only a little short of that required for complete fusion. Some of the materials put in the kilns have been subjected to previous heat treatment and reaction in other kilns either at the Lincoln plant or in supplier's plants.

8. The materials when put in the Lincoln kilns are ground to an extremely fine particle size, and mixed with water to get a uniform dispersion, and sodium silicate or sodium carbonate added which acts as a so-called mineralizer to promote the reaction. Such preparation of the materials affords a maximum of silicate-forming reaction at temperatures short of complete fusion.

9. The materials have been completely reacted by the kiln treatment. The basic constituents are completely reacted by the time they leave the kiln. So, too, is the acidic constituent. Such reactions render the flux substantially anhydrous and free of gas-forming materials that would yield deleterious amounts of gas during welding (page 3, col. 1, lines 4-11). Moreover, such reacted acidic and basic materials are reacted with each other by the time they come out of the Lincoln kilns to an extent that the resulting flux contains a substantial amount of silicate.

10. There is sufficient silicate in the defendants' fluxes to accomplish the desired results, and they are substantially the same with respect to silicates as required by claims Nos. 18, 20, 22 and 23 of the Jones *et al.* patent. Such of the silicate-forming materials present in the finished fluxes as are not completely combined with each other to form silicates are, however, reacted to the extent required by the patent to eliminate gas-forming reactions and are, therefore, the equivalent of silicate for the purposes of claims 18, 20, 22 and 23.

11. The particular silicates in the Lincoln 760, 770, 780 and 840 fluxes include manganese silicate and complex manganese, sodium, iron, calcium silicates. The 840 flux contains, in addition, silicates of magnesium and zirconium.

12. The "physical condition" for the flux, described in the patent specification, has also been satisfied in the defendants' fluxes. Each of their fluxes is a finely-divided, free-flowing granular material.

13. The defendants' 840 flux contains an admixture of some twenty per cent of alumina (alumina oxide).

14. The Lincolnweld 760, 770, 780 and 840 fluxes are each of them substantially the same thing as the compositions defined in each of Jones, *et al.*, claims 18, 20, 22 and 23. They operate in substantially the same way as such compositions, and they produce the same result.

15. Subsequent to the introduction of Lincolnweld 660, the only Lincolnweld fluxes marketed and sold by defendant The Lincoln Electric Company, have been Lincolnweld 760, 770, 780 and 840. These were first made and first sold commercially as follows:

Lincolnweld 770 was first made in June 1948 and was first sold commercially in July 1948. The manufacture and sale of this flux was discontinued in April 1950.

Lincolnweld 780 was first made in February 1949 and was first sold commercially in March 1949.

Lincolnweld 760 was first made in March 1950 and was first sold commercially in June 1950.

Lincolnweld 840 was first sold commercially in the early part of 1951.

16. Defendant Graver Tank & Mfg. Co. Inc., at all times since July 10, 1950, has been using, with knowledge of the injunction, the Lincolnweld flux 780.

17. The Lincolnweld 760, 770, 780 and 840 fluxes satisfy the requirements of an "equivalent" as set forth in Conclusion of Law No. III herewith.

18. Defendants' fluxes do not follow the teachings of Miller Patent No. 1,754,566 (Exhibit D-61).

19. Defendants had full knowledge of the contents of the writ of permanent injunction issued by this Court on July 10, 1950 and violated such injunction either intentionally or with disregard of the rights of the plaintiff. Common sense should have told defendants that they were getting too close to the patent and that their fluxes were substantially the same in their use and result, as the compositions of the patent claims in suit.

20. In so far as the defendants' answer and further answer to plaintiff's motion to adjudge defendants in contempt of court raises defenses in addition to those covered by the foregoing findings, the defendants have failed to sustain such additional defenses by a preponderance of the evidence.

Conclusions of Law.

I.

Infringement is not merely a matter of words but is one of substance. In order for a welding composition or flux to infringe claims 18, 20, 22 and 23 of the Jones, *et al.* patent, it must be substantially the same thing, operate in substantially the same way, and produce the same result as the composition described in the claims.

II.

The claims of the Jones, *et al.* patent are to be read and interpreted in the light of the entire disclosure of the patent, not literally *in vacuo,* and the verbiage of the patent should be considered in ascertaining the scope and purview of the claim.

III.

An "equivalent" of a composition claimed is an infringement of the claim. The essence of the doctrine of equivalents is that one may not practice a fraud on the patent. If two compositions do the same work in substantially the same way, and accomplish substantially the same result,

they are the same, they are equivalents, even though they differ in name, form or shape.

IV.

Defendants have failed to make out a case of file wrapper estoppel.

V.

Defendants, The Lincoln Electric Company and Graver Tank & Mfg. Co. Inc., have continuously violated the writ of permanent injunction since it was issued by this Court on July 10, 1950.

VI.

The Lincolnweld fluxes Nos. 760, 770, 780 and 840 were covered by claims 18, 20, 22 and 23 of the Jones *et al.* Patent No. 2,043,960. Defendant, The Lincoln Electric Company, by making, using, advertising and selling such fluxes, has trespassed upon and infringed said claims 18, 20, 22 and 23. And defendant Graver Tank & Mfg. Co. Inc., by using the Lincolnweld flux 780, has trespassed upon and infringed said claims.

VII.

Plaintiff's motion dated December 1, 1950 to adjudge defendants in contempt of court, as amended to include Lincolnweld flux No. 840, should be granted as to defendant The Lincoln Electric Company. The motion should be granted as to Graver Tank & Mfg. Co. Inc. with respect to Lincolnweld flux No. 780. The motion should be dismissed as to James Finney Lincoln.

The opinion filed herein on November 26, 1951, shall be considered a part of these findings of fact and conclusions of law.

Dated: December 10th, 1951.

CHAS. A. DEWEY,
United States District Judge.

IN THE

UNITED STATES COURT OF APPEALS

FOR THE SEVENTH CIRCUIT.

OCTOBER TERM, 1951, JANUARY SESSION, 1952

No. 10532

UNION CARBIDE & CARBON CORPORATION,

Plaintiff-Appellee,

vs.

GRAVER TANK & MFG. CO., INC., AND THE LINCOLN ELECTRIC COMPANY,

Defendants-Appellants.

Appeal from the United States District Court for the Northern District of Indiana, Hammond Division.

[Decided March 26, 1952.]

Before MAJOR, *Chief Judge,* KERNER and LINDLEY, *Circuit Judges.*

MAJOR, *Chief Judge.* This is an appeal from a judgment, entered December 10, 1951, by Judge Charles A. Dewey, sitting by assignment in the United States District Court for the Northern District of Indiana, Hammond Division, adjudging defendants in contempt of court for violating an injunction issued by Judge Luther M. Swygert July 10, 1950. The proceeding which led to the entry of the judgment in controversy was an aftermath of litigation involving United States Patent No. 2,043,960, relating to a process or method of electric welding and to compositions for use in such process. In the original suit, sixteen process and seven composition claims were relied upon. All of the process claims, as well as composition claims 24, 26 and

27, were held invalid. Composition claims 18, 20, 22 and 23 were held valid and infringed. 86 Fed. Supp. 191. This holding of validity and infringement as to these four claims was, on appeal, affirmed by this court. 167 F. 2d 531. At the same time, this court held valid all process claims and composition claims 24, 26 and 27. On certiorari, the Supreme Court affirmed Judge Swygert in all particulars and reversed this court insofar as its decision was inconsistent with that of Judge Swygert. 336 U.S. 271 (afterward referred to as the first decision of the Supreme Court). The Supreme Court granted rehearing, limited to the question of infringement of the four valid composition claims, and again sustained Judge Swygert's finding of infringement as to defendants' composition 660, by application of the doctrine of equivalents. 339 U.S. 605 (afterward referred to as the second decision of the Supreme Court). Thereupon, plaintiff disclaimed all the process claims and composition claims which had been held invalid.

Subsequent to the second decision of the Supreme Court and on July 10, 1950, Judge Swygert, pursuant to the mandate of that court, issued a permanent injunction enjoining defendants "From making, using, advertising or selling Lincolnweld 660 flux or any other welding composition or flux covered by any of Claims 18, 20, 22, and 23 of said Patent No. 2,043,960, or offering so to do, aiding or abetting or in any way inducing infringement of said Claims * * *."

Of the four claims held valid by Judge Swygert and sustained by the Supreme Court, for the infringement of which defendants have been held in contempt by Judge Dewey, plaintiff says, and we think correctly, that claim 23 is typical. It reads:

> "23. A finely-divided unbonded fusible composition for use in electric welding employing a bare metal electrode as a source of weld metal, said composition being substantially free from substances capable of evolving a detrimental quantity of gas under welding conditions and containing calcium fluoride and *a major proportion of*

one or more alkaline earth metal silicates." (Italics here and subsequently in this opinion ours, unless otherwise noted).

Defendants continued the manufacture and sale of 660 flux until July 10, 1950. In the meantime and during the course of the litigation, defendants commenced the manufacture and sale of its composition fluxes numbered 770, 780 and 760 (sometimes referred to as the "700 series" Lincoln fluxes). Plaintiff's contempt motion, filed in December 1950, named only the "700 series" fluxes. Early in 1951, defendants introduced another composition, 840. Thereupon, the court gave plaintiff leave to amend its motion for contempt so as to include this new number.

The controversy here revolves around the effect given to the requirement of the claims that the composition contain "a major proportion of one or more alkaline earth metal silicates." In the former litigation, the controversy was confined to the words, "one or more alkaline earth metal silicates," while instantly it is more specifically directed to the words, "a major proportion." Defendants' 660, adjudged to infringe, consisted of 95% or more of manganese silicate, while plaintiff's Unionmelt 20 consisted of slightly less than 95% of alkaline earth metal silicates. The Supreme Court in its second decision held that manganese silicate was the equivalent of an alkaline earth metal silicate and, applying the doctrine of equivalents, found infringement. In the compositions of both plaintiff and defendants there before the court, the ingredients were component parts and had been fully prefused, with complete chemical reaction. That this dual action was taught by the patent there can be no doubt. Whether it was required is a question, as will subsequently appear, of much importance in the instant case.

Plaintiff states that the appeal involves a single contested issue, that is, whether the trial court was clearly in error in finding that the defendants violated the writ of permanent injunction by the manufacture, sale and use of the accused fluxes. Obviously, that is the ultimate issue, but its resolution is dependent upon numerous subsidiary

issues raised by the defendants. They contend, (1) that none of the accused fluxes contain "a major proportion of alkaline earth metal silicates," as called for by the claims; (2) the specifications demand that "the chemical reaction between the components of the welding composition must be completed before it is used in welding," i.e., that silicates be formed therefrom; (3) broader claims were rejected and the limitations to "a major proportion" and to "silicates" as distinguished from their component ingredients introduced to avoid rejection; (4) the limitations were relied on both in the Patent Office and in the courts to distinguish the claimed flux from the prior art, and (5) the distinction expressed in these claim limitations and the specifications has become res adjudicata in this case.

Other contested issues raised by the defendants may or may not become material, dependent upon a decision of those which we have stated.

The prior electric welding art, the nature of the Jones invention, the reason for sustaining the validity of the four composition claims now in dispute, as well as that for invalidating three composition and all process claims, are shown in detail in the opinion and findings of Judge Swygert, by the opinion of this court and by the opinions of the Supreme Court, and we need indulge in no detailed repetition. It may be noted, and we think this is without dispute, that plaintiff's flux, with its "alkaline earth metal silicates," as well as defendants' 660 flux, held to infringe by use of its manganese silicate, adjudicated to be an equivalent, are both completely reacted and, when fused, consist of chips of homogenous, glassy material described by the patent as "characterized by vitreous fracture" (i.e., broken glass). On the other hand, the accused fluxes consist of non-homogenous granules composed of particles of the different components held together by a binder but visibly retaining their individual characters. This difference is due to the fact that the chemical reaction between the components of plaintiff's welding composition are complete before use, while in the accused compositions the chemical reaction is not complete before use. True, there is

a dispute; in fact, defendants contend that there is no chemical reaction between the components of the accused fluxes, while plaintiff contends that at least partial reaction takes place. Defendants contend that they do nothing more than heat the raw materials in a gas oven for the purpose of driving out water vapor and other gases, and not for the purpose or with the result of producing chemical reaction among the components.

We think it is not in dispute but that the chemical reaction is essential to produce the "silicates" called for in the claims.[1] Defendants' process by which their compositions are produced requires heating for short time to a maximum temperature of from 1400° F. to 1800° F., while plaintiff's process by which its fluxes are produced requires heating for a longer period at a temperature of 2800° F. This difference in the temperature accounts for the fact that plaintiff's fluxes are completely chemically reacted prior to use in the welding process while those of the defendants experience no such chemical reaction or, at any rate, only partial reaction. More specifically, plaintiff's product when manufactured and sold is completely reacted from a chemical standpoint, while defendants' product is not. At most, and this is doubtful, it has been only partially reacted, and the completion of the reaction takes place, if at all, at the time of and in connection with the welding process.

Plaintiff devotes more energy than necessary, we think, in emphasizing the importance of its invention. Its merits have been sufficiently extolled by the courts before which it has been litigated and it requires no further testimonial. And we think some of the confusion in the case arises from the failure to distinguish between plaintiff's composition as described in the four claims in suit and the process employed in the utilization of it composition. It must be kept in mind that all of its process claims have been declared invalid in view of the prior art. As Judge Swygert

[1] Dr. Willard, a professor of chemistry and an important expert witness for the plaintiff, was asked, "Now, what, in a little more detail, do you mean by a reaction?" He answered, "A reaction in the chemical sense is one in which there has been a chemical combination between two substances to form another substance with totally different properties."

stated (86 F. Supp. 191, 195), "The mechanical operational steps involved are identical with those used by Robinoff [No. 1,782,316]. Indeed, the patentees who started with the teachings of Robinoff merely sought an improved welding composition or flux to be used with his operational method." In fact, it appears undisputed but that both plaintiff and the defendants use the process or operation taught by Robinoff, as they each have a right to do.

Plaintiff, naturally and rightly, relies heavily upon the two decisions of the Supreme Court, the first of which (336 U.S. 271) held that Rule 52 (a) of the Federal Rules of Civil Procedure is controlling and that reversal is permissible only where the findings of the trial court are "clearly erroneous," and the court sustained the findings of the District Court both upon the issues of validity and invalidity of the claims in suit. The court pointed out, referring to the District Judge (page 274), "He concluded that what was really invented was that which was claimed and bounded by the composition claims Nos. 18, 20, 22 and 23." The court also pointed out (page 277), "We have frequently held that it is the claim which measures the grant to the patentee." (Citing cases.)

We need not stop to inquire to what extent, if any, the Supreme Court has modified or retracted its view as to the applicability of Rule 52 (a) in patent litigation (but see *Great Atlantic & Pacific Tea Co.* v. *Supermarket Equipment Corp.*, 340 U.S. 147). This is so for the reason that we think the issue for decision is legal rather than factual and, furthermore, we are not so much concerned with the findings made by Judge Dewey as we are with those which he failed to make and on one important issue (subsequently discussed) which he refused to make.

In the second Supreme Court decision (339 U.S. 605), notwithstanding the court's sweeping denunciation of one who practices a fraud upon a patent and the application of the doctrine of equivalents to the facts before it, there is little, if anything, in the opinion which affords an answer to our instant problem. We note, however, that the court again stressed the weight to be given a finding

by the District Court on the issue before it and stated (page 609), "A finding of equivalence is a determination of fact." Plaintiff goes so far as to suggest that defendants' argument here is little more than a rehashing of that made to the Supreme Court. We do not so understand. There, the court held that the substitution by the defendants in their flux 660 of manganese silicate was the equivalent of the "earth metal silicate" called for in the claims. It should be pointed out, however, and this is important, that there was no contention in that case that the patentee was estopped by its previous representations and activities from claiming that manganese silicate was the equivalent of the earth metal silicate called for in the claims.

In any event, we do not understand that the Supreme Court by its decision intended to retract or modify the doctrine announced in *Exhibit Supply Co.* v. *Ace Patents Corp.*, 315 U.S. 126. There, the court had before it a patent on a gaming device commonly referred to as a pin ball game. This court (119 F. 2d 349) had held the patent valid and infringed. The claim called for a certain conductor means "imbedded in" the table. Previously a claim which required that the conductor means be "carried by" the table had been disallowed in the Patent Office. The Supreme Court, as in its second decision in the instant litigation, took the case solely on the issue of infringement, found non-infringement and reversed this court. In doing so the court stated (page 136):

> "Whatever may be the appropriate scope and application of the doctrine of equivalents, where a claim is allowed without a restrictive amendment, it has long been settled that recourse may not be had to that doctrine to recapture claims which the patentee had surrendered by amendment."

The court further stated:

> "By the amendment, he recognized and emphasized the difference between the two phrases and proclaimed his abandonment of all that is embraced in that difference. [Citing cases.] The dif-

> ference which he thus disclaimed must be regarded as material, and since the amendment operates as a disclaimer of that difference it must be strictly construed against him."

In *Schriber-Schroth Co.* v. *Cleveland Trust Co. et al.*, 311 U.S. 211, 217, the court stated:

> "But the particular invention to which the patentee has made claim in conformity to the statute is not always to be ascertained from an inspection of the specifications and claims of the patent alone. Where the patentee in the course of his application in the patent office has, by amendment, cancelled or surrendered claims, those which are allowed are to be read in the light of those abandoned and an abandoned claim cannot be revived and restored to the patent by reading it by construction into the claims which are allowed."

These explicit pronouncements by the Supreme Court have been followed by this court in *Dixie Cup Co.* v. *Paper Container Mfg. Co.*, 169 F.2d 645, and *Ric-Wil Co.* v. *Kaiser Co.*, 187 F.2d 1.

Judge Dewey in his conclusions of law stated that the accused fluxes infringe because they do "substantially the same thing, operate in substantially the same way, and produce the same result as the composition described in the claims," and it is fair to assume that Judge Dewey's decision resulted in the main from the application of this principle. There is no doubt from the cases but that this test is often applied in determining the issue of infringement. The question arises, however, as to the validity of its application in a case where the doctrine of estoppel is properly invoked. While we find no case where this question has been discussed, we think it obvious that there are instances where both doctrines cannot be given effect because of their inconsistency. It appears plain that the principle relied upon by Judge Dewey could not have been given effect in the *Exhibit Supply Co.* case because it would have met head-on with the estoppel principle which the

court applied. In fact, its application would have required a different result in that case.

While we shall later refer to the findings made by Judge Dewey, we think it pertinent to make an observation or two concerning his able and well-written opinion. He states, "The Jones et al. invention is so broad and teaches so many new and additional features regarding electric welding that it seems to me the patent itself transcends in importance the compositions which are set out in the claims of the patent, and that the claims are in truth subordinate to the invention shown by the patent." At another point he states, "The defendants in relying upon the opinion of their counsel, it seems to me, should have known that the patent was much broader than the claims standing alone might indicate." These statements appear to indicate that in his view the scope of plaintiff's invention was not to be measured by its claims. If so, we think the view was erroneous. (See quote, *supra,* from 336 U.S. 271, 277.)

Also, the opinion, in response to defendants' contention with reference to estoppel, stated, "It is unnecessary to discuss these questions as I am satisfied the defendants' fluxes are composed of substantially the same ingredients as those set out in the claims of the plaintiff's patent." We doubt the validity of this reasoning. The fact, if such it be, that the accused fluxes are composed of substantially the same ingredients is no reason in itself, under the authorites we have heretofore discussed, to deny the application of the doctrine of estoppel. Thus, it appears to us that the result reached by Judge Dewey rests upon the erroneous premise, (1) the scope of the invention was not confined to the patent claims; (2) even though defendants had not overstepped the bounds of the claims they had come "too close to the patent"; (3) the accused fluxes are "substantially the same" as the patented flux and infringe because of the sameness "in their use and results."

As already noted, the decision in this case must depend largely upon the meaning attributed to the words "a major proportion of one or more alkaline earth metal

silicates," contained in each of the four claims. Defendants construe this language to call for a composition containing something more than 50% of alkaline earth metal silicates or their equivalents, while plaintiff argues that the language calls for nothing more than a percent which constitutes an important part of the flux. Dictionary definitions of the words "major" and "proportion" are relied upon by the parties as sustaining their respective contentions. We think they are of little help because definitions are available which support either view.

It is our judgment that defendants' interpretation of the controversial language must be accepted. The ordinary and usual connotation attributable to such words is hardly susceptible to any other conclusion. But more important is the history attached to these claims and, more particularly, the controverted language from the time the claims emerged from the Patent Office until the commencement of the instant litigation. Even though the specifications do not define "a major proportion," it would seem that its teachings have been forcibly illustrated by plaintiff's performance. Under the protection of the patent, and particularly these claims, it commenced and during the years has continued the manufacture and sale of its fluxes, which admittedly contain 94% of alkaline earth metal silicates or their equivalents. It is interesting and we think also pertinent to note that so far as we are aware plaintiff had never, until the commencement of this contempt proceeding, contended or raised any question but that this controverted language required a composition containing at least more than 50% of the designated silicates.

We suspect, however, that plaintiff's failure previously to advance its present definition of "a major proportion" was due to the realization that such a concession would place in serious question the validity of the claims. If "a major proportion" means or can be interpreted to mean any percent—10, 20 or 40—their validity would be open to serious challenge because of their indefiniteness and uncertainty. As the Supreme Court said (first decision, page 277), "The statute makes provision for specification separately from the claims and requires that the

latter 'shall particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery.'" (Title 35 U.S.C.A. §33.) These observations, of course, are not intended to reflect upon the validity of the claims, but they are such that we should hestitate to now accede to an interpretation which, if it had been made at the time their validity was under attack, would in all probability have resulted in a contrary decision on that issue.

The file wrapper history, we think, militates strongly against plaintiff's instant position. Perhaps no good purpose can be served and certainly it would unduly prolong this opinion to review this history in detail. On numerous occasions, claims general in their nature were rejected by the Examiner, and it was only after amended claims were submitted which were specific in calling for "a major proportion" that the present claims were allowed. In arguing in support of claims 32 and 33, which eventually became claims 22 and 23 (two of those in suit), the patentee stated:

> "Judging from applicants' knowledge and the prior art cited, the applicants were the first to discover that the compositions disclosed in the present application, e.g., compositions consisting *principally* of alkaline earth metal silicate in a finely divided unbonded state, are useful as electric welding compositions in which a bare metal electrode is employed as the source of weld metal."

In the same argument, in distinguishing Severance (No. 429,777), the applicant stated:

> "Therefore, Severance does not disclose nor suggest an electric welding composition in which an alkaline earth metal silicate or its equivalent constitutes the *major portion* of the composition. Even if the content of the pumice-stone and the dolomite or silicate are considered together, such ingredients still would constitute but a *minor proportion* of the entire compound."

This argument was made by the applicant even though Severance showed a silicate content of between 20 and 33%, which was distinguished on the basis that it constituted "but a minor proportion of the entire compound." Other claims were rejected by the Examiner, with the statement: "Further he does not teach that an alkaline earth metal silicate and/or an alkaline earth metal fluoride in pure form or in *just any proportion* of a combination is efficacious."

Further claims were submitted, including claims 11 and 13 (claims 18 and 20 now in issue). The applicant stated of these claims, "These characteristics are, briefly, a *high content* of alkaline earth metal silicate, and substantial absence of uncombined iron oxide."

Thus, these four claims were allowed on applicant's representation that the alkaline earth metal silicate was of "high content," that it was the "principal" ingredient of the combination and that it was of "a major proportion," in contrast with "a minor proportion" as disclosed by Severance. The representations made at that time are in marked contrast to plaintiff's present position, wherein it is asserted in effect that the proportion of earth metal silicates is immaterial and that the test is whether they are sufficient to obtain the desired result.

Plaintiff calls attention to the fact that claim 24 was allowed, which called for "a fluxing material for electric welding comprising metallic silicate and calcium fluoride," and appears to argue from this that "a major proportion" was not a controlling consideration upon which allowance of claims was obtained. It must be noted, however, that this broad claim was held invalid by Judge Swygert (affirmed by the Supreme Court) and, as already suggested, we think the claims before us would have met the same fate had they been couched in such broad language, that is, if they had failed to designate the proportion of silicate or if the designation employed, i.e., "a major proportion," had been interpreted as plaintiff now urges.

Judge Dewey did not determine, in fact refused to make a finding, as to the proportion of silicate contained in the

accused fluxes. It would have been well near impossible to do so. Rarely have we studied a record which is so replete with contradictions and with opinions, some of which are based on assumptions admitted not to exist. Judge Dewey stated:

> "It would be a little difficult from the testimony of the experts to come to a positive decision as to whether defendants' composition did contain a major proportion of silicate as the experts are somewhat divided on the question. All of the experts for the plaintiff and at least some of the experts for the defendants admit that there are some silicates of a kind referred to in the claims of the patent appearing in defendants' product in some appreciable degree, but differ as to the amount."

This statement, so we think, begs the issue. How can a composition claim which requires "a major proportion" be infringed by a composition which contains the critical element only in an "appreciable degree"? There is no dispute, however, but that all of the four accused fluxes contained silicates in amounts far less than 50%. Both the plaintiff and the defendants have submitted charts showing in color the component elements of the accused fluxes. (770 is not shown on the charts because, as we understand, defendants have ceased its manufacture and sale.) The percentage of silicates of alkaline earth metals and equivalents contained in the accused fluxes, as shown by plaintiff's chart, are 840, 35.6%; 760, 24%; 780, 41%. These percentages are quite favorable to the plaintiff, perhaps more so than the record justifies, for the reason that they include elements which plaintiff designates as equivalents and which may or may not be; in any event, they have not been so adjudicated. Plaintiff's chart also shows what it denominates as "incipient" silicates (i.e., components heated to free them of gas and moisture) in the following amounts: 840, 57.4%; 760, 29.2 to 64%. No "incipient" silicates are shown for 780. "Incipient" silicates, according to plaintiff's theory, are components which embrace the potentiality of developing silicate when chemically reacted.

The word "incipient," so far as we know, is without significance in chemistry and is a stranger to the patent specifications and to the proceedings in the Patent Office. It is plaintiff's theory, however, as we understand, that what it denominates "incipient" silicates are the equivalent of the silicates called for in the claims, and thus plaintiff reaches the conclusion that the accused fluxes contain "a major proportion" of silicates.

The frailty of this argument resides in the fact that it ignores the teachings of the patent as well as the basis upon which the claims were adjudged to be valid. This argument ignores the difference between the complete chemical reaction attained at high temperature taught by the patent and employed by the plaintiff in producing a composition with "a major proportion" of silicates, and defendants' method of heating at low temperature to free its composition of gas and moisture but not sufficient to produce silicates in any definable amount. The patent specification states, "The chemical reactions between the components of the welding composition must be *completed* before it is used in welding. Failure in this regard most surely invites porosity." And it must be remembered that a chemical reaction between two properties has the effect of producing a totally different property (see footnote 1). Again, plaintiff by its commercial flux illustrates the teaching of its patent with a composition which has been subjected to a complete chemical reaction of its elements prior to use in welding. This is also true of defendants' 660 flux, adjudged to infringe.[2] On the other hand, defendants' accused fluxes are not completely chemically reacted before use but, admittedly, there is a reaction in some undeterminable amount at situs.

Judge Swygert found that plaintiff had developed a welding composition "in which all reactions were entirely completed by prefusing at high temperature." In fact, it was this complete chemical reaction prior to use by which Judge Swygert distinguished the composition claims from the prior art. 86 F. Supp. 200.

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[2] Referring to the 660 flux, Dr. Willard testified, "This is a prefused material. We know that because unless the elements are combined at a high temperature and fused, there is no reaction between them."

In its brief filed in this court on the original appeal, plaintiff, referring to claim 23 as typical of the four claims now in suit, stated, "That, and every other claim in the patent, is qualified by the unequivocal instructions of the patent specification," and enumerated five conditions which "must" exist in order to perfect a successful welding composition. The first "must" stated was, "The chemical reactions between the components of the welding composition *must* be completed before it is used in welding. Failure in this regard most surely invites porosity." And following the enumeration of the five "musts," the brief stated, "Such imperative language puts that portion of the specification in the same category as a 'disclaimer' of anything which does not conform to those five 'musts.'" Also, when the case was previously here, plaintiff, in response to defendants' argument that the claims were so broad that they would cover fluxes whether prefused or not, answered, "But the mandatory language of the specifications requires: 'The chemical reactions between the components of the welding composition *must* be completed before it is used in welding. Failure in this regard most surely invites porosity.'"

Plaintiff in its former brief further stated:

> "Defendants also contended below that, if these claims were construed to cover their flux with its major proportion of manganese silicate, then in that light they were anticipated by Miller. The Trial Court took cognizance of and rejected that contention. The Trial Court quoted from the Miller patent to show that the preferred form of the Miller patent was a coating containing acidic and basic constituents which would react *during* the welding operation—whereas the patent in suit requires that acidic and basic constituents be reacted *before* the composition is used for welding."

And again it was stated:

> "The compositions in suit, without exception, are *prefused* in accordance with the mandatory direction of the patent that all chemical reactions

> be completed before use. The clay flux was nothing more than a *mechanical mixture* of clay, lime and ferromanganese which had been pulverized and heated well short of prefusion and then put into a tumbling barrel so as to intermix the ingredients thoroughly."

Thus, in view of the unequivocal representations heretofore made, we think it too late to contend that complete chemical reaction and fusion before use in welding was not an essential requirement of the invention. It was this characterization by the patentee which distinguished it from the prior art, both in the Patent Office and before the courts.

True, Judge Dewey found, "The materials have been completely reacted by the kiln treatment," but that statement is modified by the further statement, "Moreover such reacted acidic and basic materials are reacted with each other by the time they come out of the Lincoln kilns to an extent that the resulting flux contains a substantial amount of silicate."

If the component parts of the accused compositions have been completely reacted and thereby only contain the percentage of silicates shown, there would be no infringement because they fail to constitute "a major proportion." We do not understand, however, that plaintiff makes any contention that there has been complete chemical reaction of the components of the accused fluxes. Otherwise, plaintiff's argument as to "incipient" silicates would be without point. It is forced to the position, contrary to that heretofore assumed, that complete chemical reaction and fusion prior to use is, after all, immaterial and that defendants' fluxes infringe even though there has been no or only partial chemical reaction and fusion prior to use. And this is on the theory that the components of the accused fluxes possess the potentiality, upon complete reaction, to produce silicates in "a major proportion." There is no finding upon which this theory can be predicated, as Judge Dewey found on this point only that, "There is sufficient

silicate in the defendants' fluxes to accomplish the desired results * * *."

In our opinion, the application of the doctrine of equivalency in this case is to ignore the teachings of the patent, the representation upon which the claims in suit were allowed and, more pointedly perhaps, the representations by which their validity has been sustained in the courts. While the difference between plaintiff's composition and those accused may not be great, it is that difference which distinguished plaintiff's composition from the prior art and which enabled it to sustain the validity of its grant. It is now estopped from claiming otherwise.

The judgment appealed from is reversed and remanded, with directions that it be vacated.